THE PAPER INDUSTRY and PAPER WORLD

EDUCATIONAL NEWS MAGAZINE—SEPTEMBER, 1946

Vacuum Connection "As You Like It" with the Downingtown Suction Roll

Downingtown Suction Couch and Press Rolls are available with front or rear end suction, or with suction connection at both ends, if desired. Front end suction connection may be inside or outside the machine, as illustrated at the left. All of these arrangements are standard with us, thus no special construction is needed. Press rolls are available with or without rubber covering and we will gladly recover your old press rolls. Send for Catalog No. 120.

DOWNINGTOWN MANUFACTURING CO., DOWNINGTOWN, PA.

Outside Front End Vacuum Connection

DOWNINGTOWN

Designers & Builders

Paper Making Machinery

EVAPORATORS-CONDENSERS-FILTERS

For more than thirty years, GOSLIN-BIRMINGHAM products have been acknowledged 'standards of equipment' for pulp and paper mill use.

Choosing a product of reputation is a tribute to experience.

GOSLIN-BIRMINGHAM offers you the products of its experience . . . quality equipment, reliable and consistently performing products, low in operational and maintenance costs.

G-B's staff of engineers is available to you for the study of your individual plant problems.

GOSLIN-BIRMINGHAM MANUFACTURING CO., INC.
BIRMINGHAM, ALABAMA
[illegible] MADISON AVE., NEW YORK
[illegible]

Acres of dryer heads . . .

At Beloit these days you'll see dryer heads by the hundreds, each with the absolute precision that modern mills demand and *expect* from Beloit equipment. We are able to maintain requisite accuracy as well as production schedules by means of special equipment and a production set-up based on almost a century of paper-machine experience and precision manufacture. *Beloit Iron Works, Beloit, Wisconsin.*

BELOIT

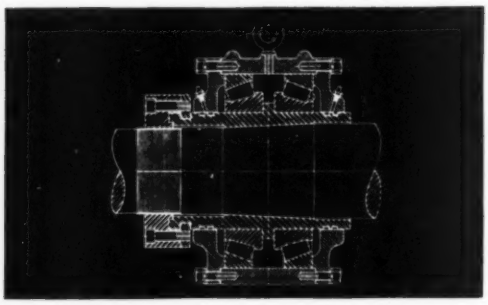
PAPER MACHINERY

WHEN YOU BUY BELOIT...YOU BUY MORE THAN A MACHINE!

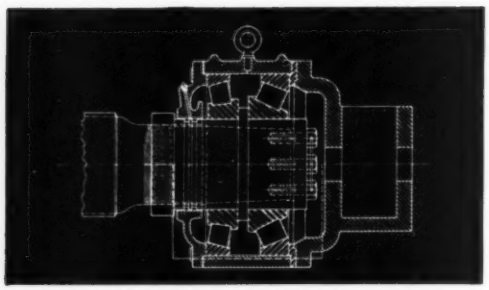
Timken Bearings meet all responsibilities in Emerson Jordans

TIMKEN Tapered Roller BEARING EQUIPPED

Emerson No. 4 Jordan Engine (largest model made) equipped with Timken Bearings at the radial and thrust positions.



Timken Bearing application as used at the radial end of the plug shaft.



Timken Bearing application as used at the thrust end of the plug shaft.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Bearings have two major responsibilities in jordan engines; they are (1) holding the plug in accurate alignment and keeping it permanently centered in the shell; (2) carrying the severe thrust load developed.

Because Timken Tapered Roller Bearings provide proper support for the plug and protect it against radial, thrust and combined loads, at the same time relieving the plug shaft from friction and wear, they are eminently suited to jordan engine service.

The Emerson Manufacturing Company, Lawrence, Massachusetts, has equipped its jordan engines with Timken Bearings for years with complete and constant satisfaction. It will pay you to have them in your jordans—but make sure the trade-mark "TIMKEN" appears on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

Your Bulk Material Can Be Economically Elevated By One Of These Units

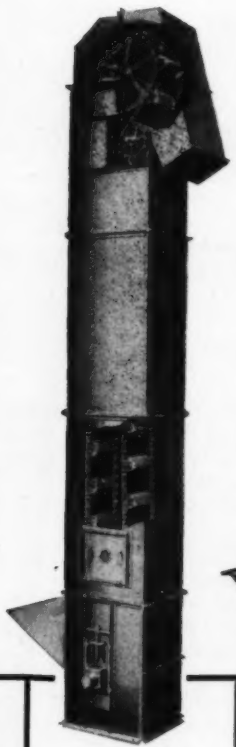
• Link-Belt engineers have had extensive experience in the design, manufacture and application of bucket elevators for varied service requirements. If your conditions call for the use of a bucket elevator, let Link-Belt show you the most efficiently performing size and type for your needs. Refer to pages 862-916 of our general catalog No. 800 for complete engineering data, specifications and information on how to select bucket elevators.

LINK-BELT COMPANY

Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

The Rotor Lift

is a Helicoid (screw) elevator which handles many products that normally can be conveyed by a horizontal screw conveyor. It consists of a vertical screw driven from either the top or bottom, operating in a solid or split casing. The material is fed to the vertical screw by screw feeder near the foot of the lift and is discharged at the top or head end.

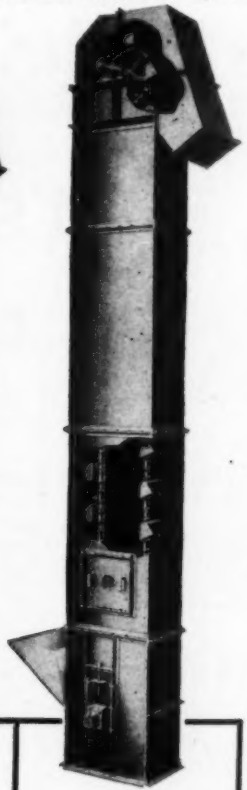


The Perfect Discharge Bucket Elevator

operates at slower speeds and is used where materials will not readily discharge at centrifugal speeds. Malleable iron or steel buckets are mounted between two strands of chain. Material is fed directly into buckets at the foot of the elevator or scooped up in the boot and discharged over a snubbed head wheel which inverts the position of the buckets over the discharge chute.

The Continuous Bucket Elevator

is used where higher capacity at slower speed is desired or where the material is friable. It consists usually of steel buckets mounted on either a chain or belt. Material is fed directly into the buckets at the foot of the elevator and discharged over a head wheel onto the preceding buckets, whose front and projecting sides form a chute, thereby directing the material into a fixed discharge spout.



The Centrifugal Discharge Bucket Elevator

is used for most products. It consists of either malleable iron or steel buckets mounted on either a chain or belt. The material is fed either directly into the buckets at the foot of the elevator or scooped up in the boot and is discharged over the head wheel by centrifugal action.

The Bulk-Flo

is used where mass conveying is possible. It consists of malleable iron or steel flights attached to a chain. The material is fed directly into the lower horizontal portion of the casing, thereby eliminating a feeder and is discharged at the opening in the upper portion of the casing, just before the flights reach the head wheel.

10,298

LINK-BELT ELEVATORS

Mathieson
SODIUM CHLORITE
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LIQUID CHLORINE
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BICARBONATE
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ONIC GAS
Mathieson
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CHLORINE DIOXIDE
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AMMONIA
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CHROMOTEX
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of a name
It's one thing to make a name. What counts more is living up to that name over and over again — year after year — so that eventually people say "That's a name you can count on."
Mathieson is that kind of a name. For over 50 years, in peace and war, in good times and bad, Mathieson has been well known for producing and delivering the highest quality chemicals according to the best traditions of American business.
Each Mathieson chemical is outstanding in its own field. Each carries an important guarantee on its label — the guarantee inherent in the name of its maker. We repeat, Mathieson is that kind of a name.
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THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

VOLUME 28 **SEPTEMBER, 1946** **NUMBER 6**

—FEATURES—

Paper Companies Must Prepare for the Uncertain Future ..... Clinton Davidson 803
The Dilution Factor in Brown Stock Washing ..... J. R. Lientz 806
The Cigarette Paper Industry ..... Leo Roberts 810
Measuring High Vacuums with the Thermal and Ionization Gauge ..... J. Gordon Seiter 813
Extraneous Components of American Pulpwoods ..... Irving H. Isenberg, Marion A. Buchanan, and Louis E. Wise 816
Convention Papers . . . Abridged 856

—NEWS—

Pulpwood and Public Relations 754
Trade Winds 755
Allied 824
Associations 832
Safety 836
Names in the News 838
Personals 838
Necrology 850

—DEPARTMENTS—

Editorial 791
Current Thought 792
Paper Sketches 823
Coming Events 832
Safety Contest Scores 836
Practical Shorts 853
New Equipment and Supplies 900
Technical Developments 904
Papermaking Patents 906
New Publications 908
Current Market Quotations 910
Index to Advertisers 913

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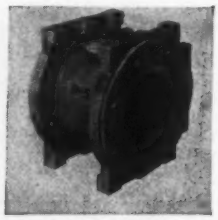
R-S valve values

ISSUED PERIODICALLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH FLOW CONTROL AND SHUT-OFF

Patented renewable replaceable rubber liner

Installing liner in valve body



Rubber liner in position

New Butterfly Valve gives 100% Complete Shut-off

Latest development in the valve field is the R-S rubber-sleeved Butterfly Valve, which for the first time in the history of Butterfly Valves gives a heavy duty 100%-effective shut-off.

The valve is currently available in sizes to handle 15 to 125 p.s.i., both using 125 lb. standard American flanges. Effective temperature range is —20° to plus 200° F.

Perfect closure is obtained from the wedge-like action of the butterfly vane closing within a one-piece flexible rubber spool which acts as a seat for the valve body and a gasket between body and pipe-flanges. A special composition of rubber and other materials has been developed to give the proper resilience while retaining long-wearing quality. A rigorously supervised test of the 125-pound valve embraced 10,000 complete movements from full open to full closed at the end of which ordeal the valve was still giving perfect shut off at 115 p.s.i.

Obviously, any ordinary use of a valve would require 10,000 closings in nothing less than a very long time. However, replacement of the rubber sleeve, if necessary, is unusually simple. After the valve body is cleared from the pipe-flanges the rubber replacement spool is folded up like an old fishing hat and thrust through the body. The flanges of the spool are patted down smoothly on the body flanges, and bolt-holes brought into alignment. "A child can operate it," as the old-time advertisers would say. The rubber spool flange takes the place of the usual flange-gaskets, a not inconsiderable economy. Patent is pending.

When Ordering Butterfly Valves . . .

1) State size of valve.
2) State type of flanges.
3) State nature of gas, liquid or other material to be controlled.
4) State line pressure.
5) State pressure loss in valve.
6) State operating temperature.
7) State rate of flow.
8) State method of control desired.
9) Get a copy of Catalog 14-B on R-S Butterfly Valves. (Write, R-S Products Corporation, Wayne Junction, Philadelphia 44, Pa.) It simplifies ordering by giving you pages of detailed diagrammatic drawings keyed to dimensional data, with illustrated descriptions of control methods.

* * *

New Tennessee and Texas Distributors

C. E. Johnson & Associate, who have handled R-S Valves in Georgia have now added Tennessee to their territory, with headquarters continuing at Atlanta.

Power Specialty Company is now the distributor for Texas and Louisiana, covering also Mobile, Alabama. Oke W. Muller is manager at headquarters in Houston, with a branch office at Corpus Christi in charge of Sam H. Young.

Mash Flow Control in Distillery

The new five stage Mash Cooler installation by Guardite Corporation for the huge Hiram Walker & Sons Distillery at Peoria, world's largest liquor distillery, is the only one of its kind in the world.

In the production of spirits, cooling of the mash is necessary after cooking. In this giant cooler an exhaust line leads from each stage to a steam jet vacuum producer in the next stage, then to a barometric condenser where cooling is accomplished by evaporation. Between each stage and the vacuum producer of the next stage the control of flow is effected.

After the first, second, and third stages, are R-S Butterfly Valves of 12-inch, 18-inch, and 24-inch sizes, respectively, operated automatically by Taylor #48 diaphragm operators and positioners; after fourth and fifth stages, are 36-inch R-S Butterfly Valves with Republic 5" by 12" cylinder operators. All are actuated by vacuum.

The success of the entire operation depends largely on the sensitive control of R-S Valves which maintain the proper vacuum without hunting or sticking.

Corrosion Chief Valve Problem

A survey by CHEMICAL & METALLURGICAL ENGINEERING in 59 plants showed that 28% of all plantmen interviewed considered corrosion problems their first concern in the maintenance of valves. In a subsequent issue of VALVE VALUES you will find a more extended discussion of valve-corrosion problems and something about how R-S Butterfly Valves are designed as an answer to the problem.

* * *

What Materials do you Pipe?

Everything that flows passes through R-S Valves. Air, other gases and vapors, catalysts, water and steam, paper-pulp, powdered fuel, sewage, soap, tars, asphalts, petroleums, synthetic rubber, acids, and many semi-solids are commonplace in R-S experience.

* * *

18" Heavy Duty R-S Butterfly Valve Type 432 for Pulp Chest Pump Isolation at Northwest Paper Company

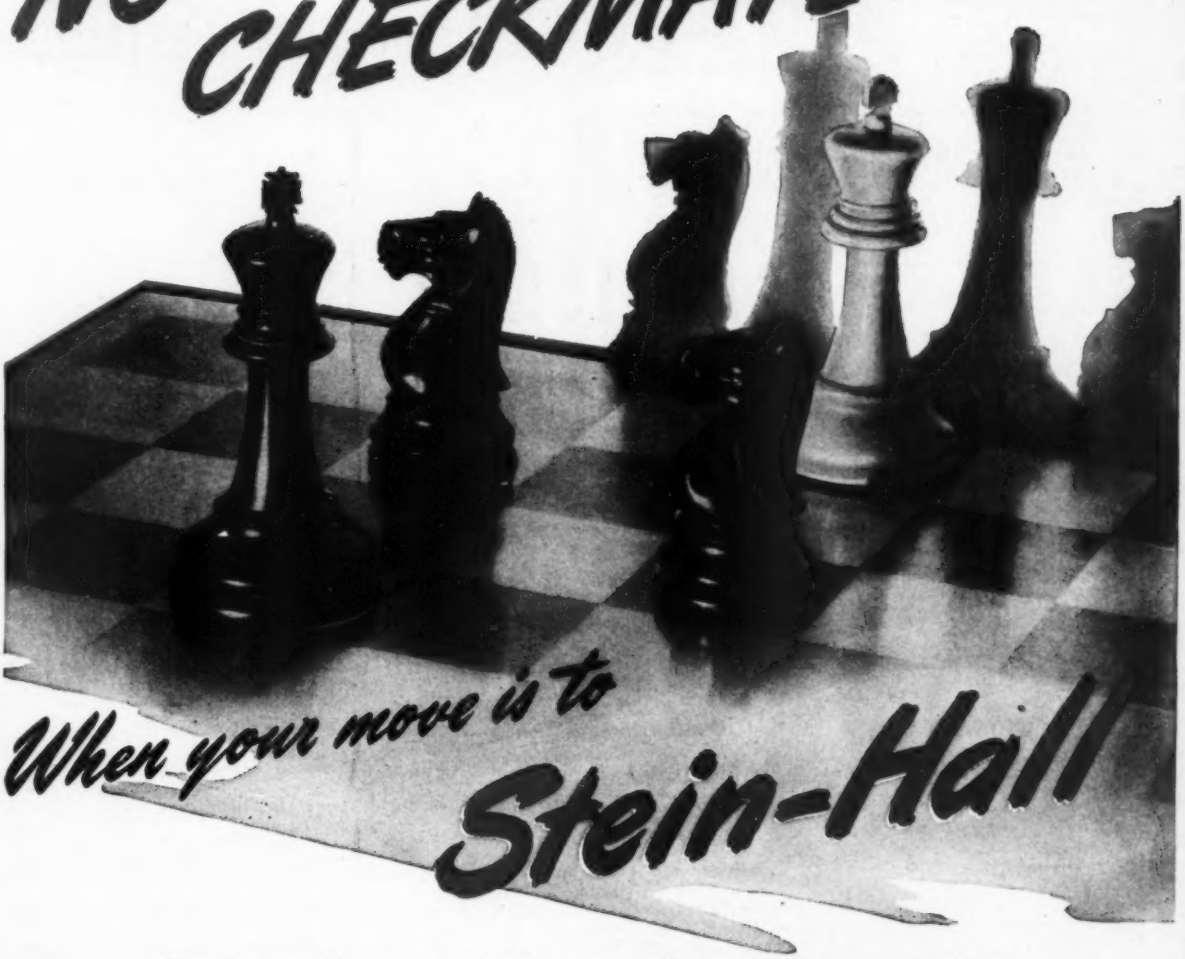
* * *

Complete R-S Valve Installation Data

Engineers like the complete dimensional data supplied for R-S Butterfly Valves. Dimensions are tabulated by standard sizes under stock types and identified by letters corresponding to detailed drawings which accompany the tables. Six full pages of R-S Products' Catalog No. 14-B (copy on request to R-S Products Corporation, Wayne Junction, Philadelphia 44, Pa.) are devoted to this basic installation data.

JMLco J-3

NO CHECKMATE



When your move is to Stein-Hall

This is a problem in good chess. It is also a problem in good business. On the board, the white king is checked, but not **check-mated.** He can move out of danger.

In business, too, there are constant checks by shortages which must be licked by substitution or new production techniques. Helping our customers move out of these checks is our job.

Stein Hall technicians and field representatives know the problems of your business. They are plant wise and production wise. They have back of them Stein Hall's long experience and unsurpassed research facilities.

It will pay you to plan now to move out of check by calling on Stein Hall for advice and counsel.

80 YEARS OF SERVICE TO THE ADHESIVE INDUSTRY

STEIN SH HALL

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EST. 1946

LABORATORIES AT NEW YORK, CHARLOTTE, N. C., PROVIDENCE, R. I., CHICAGO

NEW Monsanto Plasticizers

SANTICIZER 130
SANTICIZER 131

CLEAR and practically colorless

Both of these new Monsanto plasticizers — Santicizer 130* and Santicizer 131* — are clear and practically colorless liquids, have an exceptionally wide range of compatibility and are comparatively stable under heat.

Santicizer 130 and Santicizer 131 are suggested for use as plasticizers in cellulose acetate molding compositions; plasticizers in lacquer type coatings; plasticizers in paper coatings, to impart gloss and improved transparency. They are especially useful to modify shellac, zein and similar type products. In general, they impart toughness, high gloss and good flow.

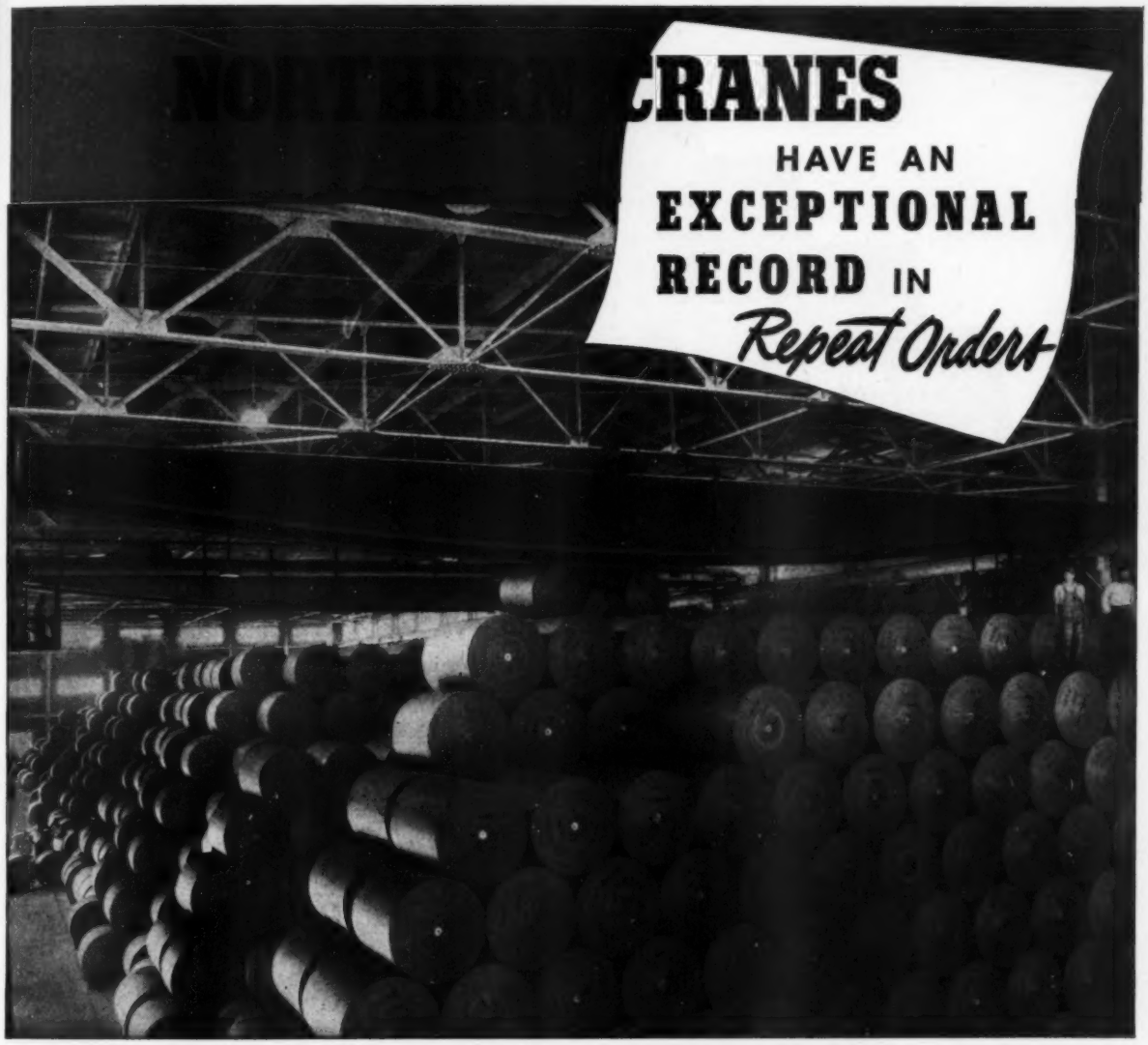
(Both of these plasticizers are available in pilot-plant quantities only.)

For complete details, including compatibility data, ask for Technical Bulletins O-D-100 and O-D-101. Contact the nearest Monsanto Office, or write direct to: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

*Reg. U. S. Pat. Off.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

CHEMICAL AND PHYSICAL PROPERTIES:		
	SANTICIZER 130	SANTICIZER 131
REFRACTIVE INDEX AT 25°C.	1.5300—1.5310	1.5295—1.5315
SPECIFIC GRAVITY 25/25°C.	1.1760—1.1770	1.1680—1.1725
COLOR	APHA 40 Maximum	APHA 40 Maximum
ODOR	Very slightly fruity	Very slightly fruity
ACID (as H_2SO_4)	.005—.01	.005—.015
CRYSTALLIZING POINT	Becomes a glass-like solid at −30°C.	Becomes a glass-like solid at −30°C.



Years of Experience With Paper Mill Cranes and Hoists

For years Northern has designed and built overhead cranes of all kinds especially for the paper industry. We have furnished handling equipment to the majority of the large mills throughout the United States and Canada. This wide experience has resulted in the development of cranes and hoists built particularly to suit the industry's needs.

Northern Cranes and Hoists are furnished to handle any load, with speeds, lift, span, etc. to suit your requirements.

Many paper mills are regular purchasers—have large numbers of Northern Cranes and Hoists in operation.

Repeat business of this sort is obtained only by the very highest quality—the type of quality built into Northern Cranes.

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COOPER'S 25 YEARS

. . . and what they mean to users of Stainless Steel Castings

The quarter century spent by Cooper in specialized study of stainless steel castings is strongly reflected in the company's ability to produce sound castings—and to give equally sound advice on their application. Over such a long period, it was inevitable that this ability of Cooper's to produce a superior product would become known to industry everywhere—with the natural result that Cooper's business growth has been phenomenal.

To you, as a user of stainless steel castings, Cooper's 25 years—and Cooper's present size—represent important values not elsewhere available.

Cooper's quarter century gives you the benefit of an experience dating from the earliest days of chromium-iron castings in this country—an experience that sweeps through the multitude of developments in casting techniques, metallurgical controls and inspection with X-rays, Gamma rays and Ultra Violet rays—an experience embracing the inception of and continued improvements in machine molding, sand control, heat treatment, centrifugal casting and machining methods.

Cooper's size—it's the largest exclusive stainless steel foundry in the country—gives you an added measure of experience—breadth. The organization is large enough to include, as it does, *all* the highly specialized knowledge required to give you the best in castings and the best advice on their application.

Whenever you need stainless steel castings, we sincerely believe it will pay you to get in touch with Cooper.

THE COOPER ALLOY FOUNDRY CO.

125 Bloy Street, Hillside, N. J.

CA-166

it's DEPENDABILITY you want in a FIRE PROTECTION SYSTEM!

The 100,000-gal. Horton elevated tank shown above provides gravity water pressure at a manufacturing plant. It is 100 ft. to bottom. Tanks like this are widely used with automatic sprinkler systems in the paper industry.

An automatic sprinkler system is of little value without a *dependable* supply of water to "back it up." Horton all-welded elevated water tanks are widely used at pulp and paper mills to provide *dependable* gravity pressure for sprinkler systems. *Elevated* storage helps to protect lives and property from fire by holding a reserve of water above the area it protects, ready to flow the instant a blaze breaks out.

A tank supplying a sprinkler system must be of sufficient capacity to provide the required fire flow. Most installations for automatic sprinkler service require a gravity supply of 50,000 to 250,000 gals. Horton elevated tanks of welded construction are available in standard capacities to meet the requirements of insurance rating organizations.

If you are planning to install an automatic fire protection system be sure to include Horton elevated water storage. Write our nearest office for quotations. Please state capacity required, height to bottom and location.

CHICAGO BRIDGE & IRON COMPANY

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Cleveland, 15 ..... 2267 Guildhall Building
Los Angeles, 14 ..... 1459 Wm. Fox Building
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Detroit, 26 ..... 1566 Lafayette Building
In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

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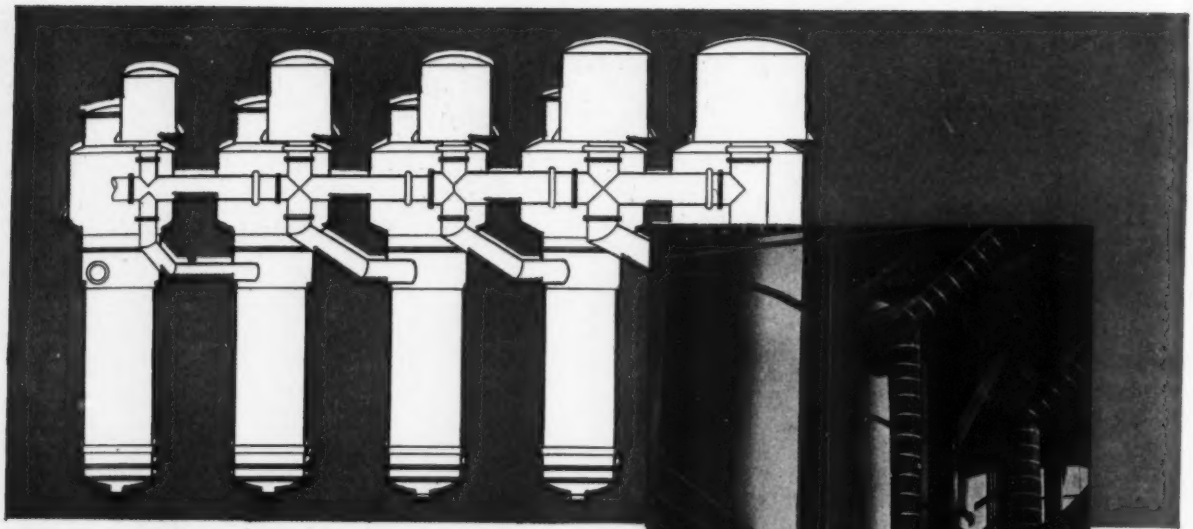
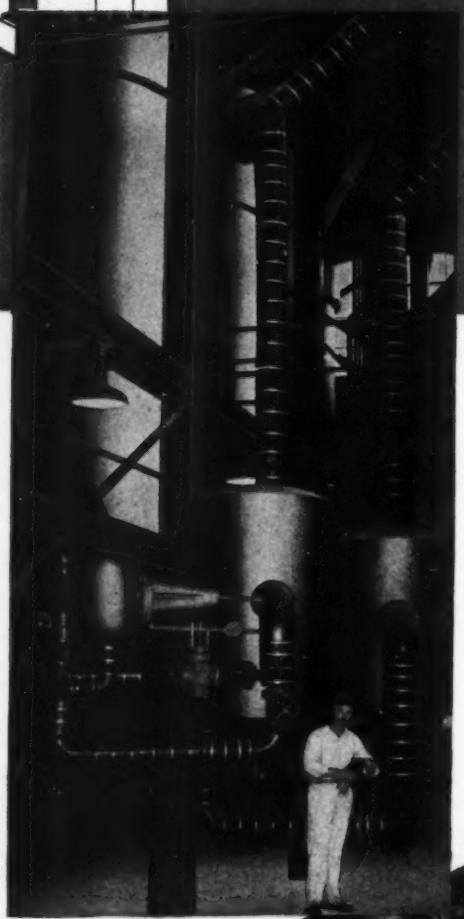
To help you get full value from your Diamond Liquid Chlorine, Diamond offers the services of a field and consulting technical staff. Thus the high quality and dependable purity of Diamond Liquid Chlorine are employed to the fullest extent in your bleaching process. .

Diamond Liquid Chlorine is shipped to you in cylinders, multi-unit cars or tank cars, whichever best suits your requirements. We suggest you contact your nearest Diamond representative for full details.

DIAMOND
Liquid
CHLORINE

DIAMOND ALKALI COMPANY PITTSBURGH 22, PA. *and Everywhere*



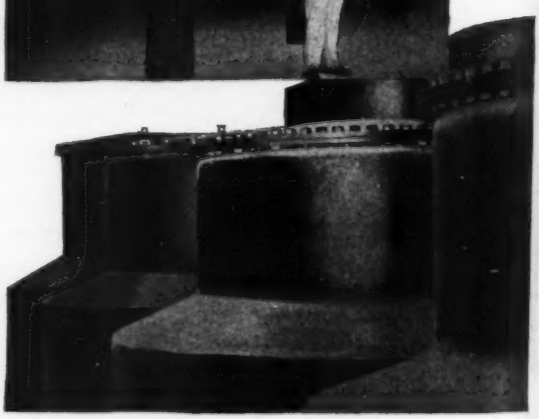


CONTINUOUS "LOW COST" EVAPORATION

At a well-known Pulp Mill, General American Conkey Multiple Effect Evaporators are today demonstrating their economy in continuous low cost evaporation of sulphate black liquor.

Such economy is assured by features of Conkey design — developed by engineers experienced in pulp mill processes — which cut entrainment losses to the minimum, give high heat transfer, and provide entirely automatic control. Dependable operation of the installation is thus insured, and maintenance and supervision requirements are reduced to the minimum.

If you have an evaporation problem involving the concentration of soda and sulphate black liquors or concentration of sulphite mill waste liquors, get in touch with a General American engineer.



EQUIPMENT FOR PULP & PAPER MILLS

Digesters	Thickeners
Blow Tanks	Storage Tanks
Turbo-Mixers	Bins
Filters	Slakers
Kilns	Recausticizing Plants

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GATX GENERAL AMERICA

ESCO Blow Pipe and Blow Pit Bottoms

In order to produce cleaner pulp, reduce costly shut-downs, and increase production, more and more pulp mill operators are changing over their old fashioned Blow Pipe and Blow Pit Bottoms to modern and clean Stainless Steel equipment.

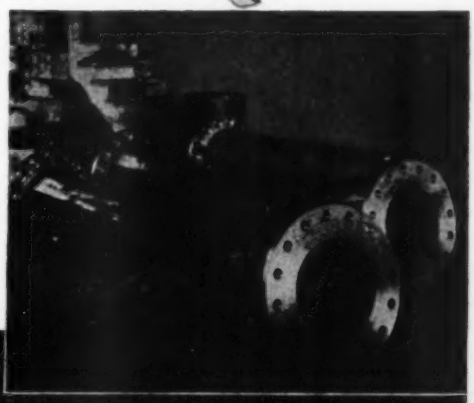
ESCO Stainless Steel Blow Pipe is designed to resist the severe stresses set up in the blowing operation and to meet the approval of State industrial and insurance inspectors. It is carefully machined, hydrostatically tested, and rigidly inspected.

Stainless Steel Blow Pit Bottoms furnished by *ESCO* are carefully laid out for economical shearing of the plate and ease of installations. They are accurately perforated to insure the most efficient drainage.

The *ESCO* engineering and metallurgical staffs are ready to assist your engineers in the selection of the proper type of Stainless Steel to use and, if necessary, to redesign your Blow Pipe and Blow Pit Bottoms for the most economical and trouble-free replacement. We invite your inquiries.

Your nearest *ESCO* representative will be glad to provide full information about any pulp mill problem involving the use of Stainless Steel. Bulletins No. 155 "*ESCO* Circulating Systems," and No. 157 "*ESCO* Stainless Steel Products" will be mailed on request.

prescription for cleaner pulp . . .



One of many stainless steel blow pit bottoms and wash piping in large Western pulp mill

ELECTRIC STEEL FOUNDRY

STAINLESS STEEL FOR ULTIMATE ECONOMY

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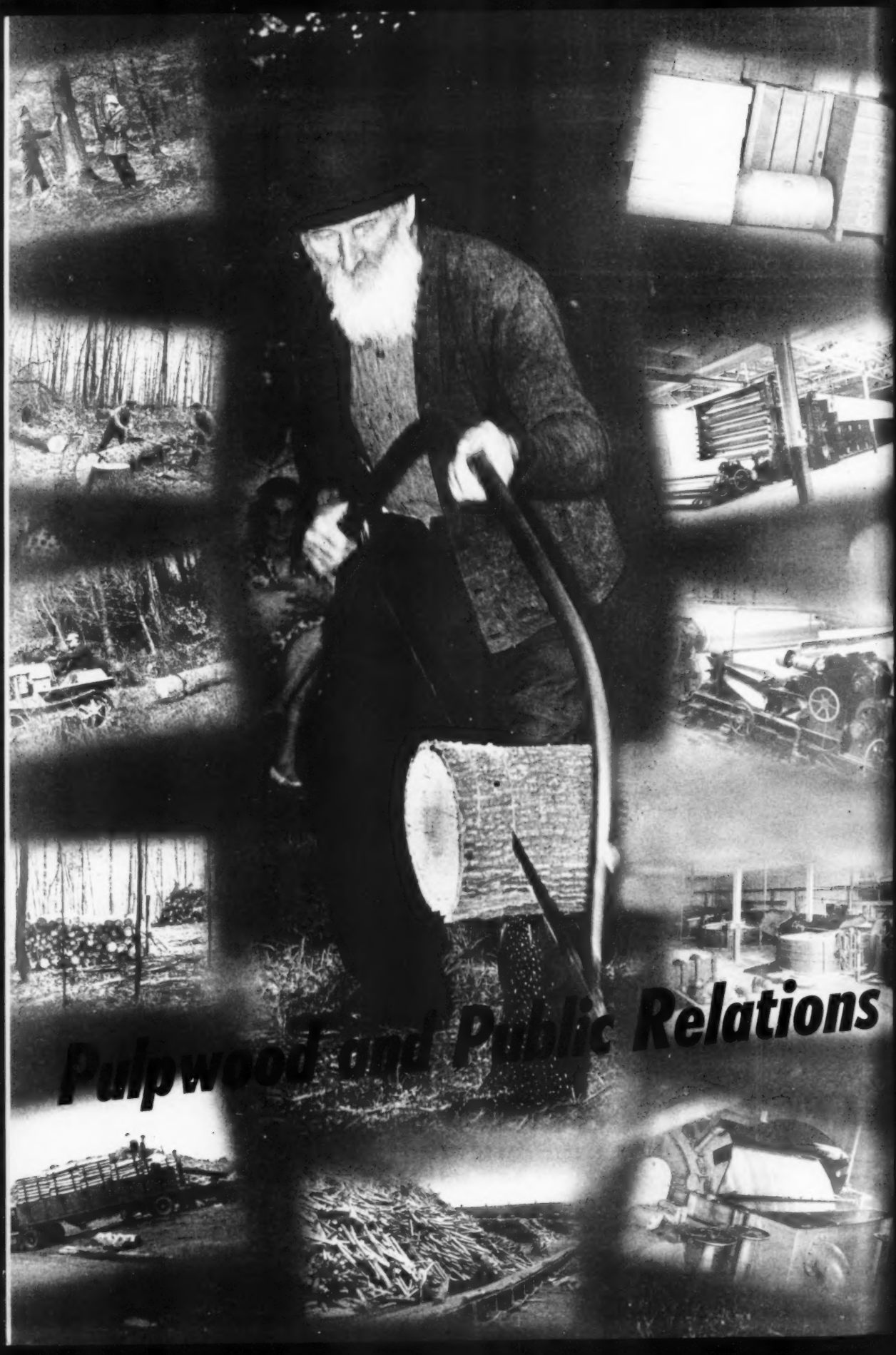

Pulpwood and Public Relations

TRADE WINDS

Pulpwood Producers Entertained

HOW TO WIN FRIENDS and interest producers has been demonstrated through public relations work by the P. H. Glatfelter Pulp Wood Company, a subsidiary of P. H. Glatfelter Pulp and Paper Company, Spring Grove, Pennsylvania.

Before the war, this company held an annual picnic and field day for its friends and pulpwood producers, but it was necessary to discontinue these affairs during the war years. However, in July this fine job of public relations was again undertaken and nearly 500 people attended the first postwar picnic. Keen interest was shown in the demonstrations and discussions which were in charge of M. H. Jefferson, of the American Pulpwood Association, on the one-man bow saw and the various power saws.

A major part of the program of these affairs is devoted to educational

P. H. Glatfelter, president of the Glatfelter Pulp Wood Company, welcomes the guests to his company's annual producers picnic

***PULPWOOD AND PUBLIC RELATIONS**—The illustration on the opposite page tells a graphic story of trees to paper and was used as the cover for P. H. Glatfelter Company's magazine, "The Barker." It is reproduced here with full permission. The elderly gentleman (center) shown taking part in one of the contests also appears in the group of producers shown below. Gathered at the producers annual picnic were producers who handle Pennsylvania's trees as part of their daily work*

LEFT—Pulpwood producers of Glatfelter Pulp Wood Company read with interest the forest management material of the American Forest Products Industries, Inc. The display and distribution of this material, designed to help producers raise more pulpwood on their timbered acres, was part of the producers picnic program. . . . RIGHT—Harry Jefferson, of the American Pulpwood Association, demonstrates the ability of "gasoline horses" to do the work faster and easier. Many a pulpwood cutter left the demonstration convinced that it was time to mechanize his equipment. Woodlot operators and pulpwood contractors traveled as much as 80 miles to attend the annual producers picnic.

features designed to assist the wood producer in increasing its woodlot's yield in producing better wood and in improving his operation.

Motion pictures were shown including "Timber Is a Crop," released under the sponsorship of the National Publishers' Association, "Trees for Tomorrow," an American Forest Products Industries, Inc., picture and a kodachrome woodlot series prepared by the Glatfelter Company, showing methods and activities on their own producers' woodlots. Forest management posters prepared by the U. S. Forest Service and the American Forest Products Industries were displayed and the AFPI booklet, "America's First Business," a story of the forest industries, was distributed.

In addition to Glatfelter Pulp Wood Company's wood producers, the gathering was attended by men representing the Pennsylvania Forestry and Agricultural Extension Services, Pennsylvania State College of Forestry, Pennsylvania Department of Forests and Waters, U. S. Soil Conservation Service, American Pulpwood Association and the American Forest Products Industries Organization.

◆

ARKELL & SMITH TO BUILD KRAFT BAG PLANT AT MOBILE

Arkell & Smith, paper bag manufacturers of Canajoharie, New York, has selected Mobile, Alabama as the site for construction of a new paper bag plant. The proposed plant will utilize the kraft paper supplies purchased from the mills in the Mobile area.

The development of the mill in the Gulf Port area represents an investment of approximately one million dollars. The plant will provide employment for 250 workers, and will begin production as soon as machinery can be obtained.

◆

IMPROVEMENTS UNDER WAY AT CENTRAL PAPER COMPANY

Improvements which will result in advancing manufacturing and research at Central Paper Company, Muskegon, Michigan, are now in progress.

One of the major developments, just completed, is a $300,000 generating plant, which produces 4,000,000 pounds of steam daily.

Work also has been started on a two-story research laboratory adjoining the office. This building will contain the office of the firm's technical director, who will supervise research.

Other improvements include installation of a Smith-Egan continuous beater, the first step toward complete modernization of the company's beater room, and the installation of a new sulphate recovery unit which includes a specially-designed turbo-waste heat evaporator and flue gas scrubber. G. W. Smith, president of the company and direct supervisor of its research engineering department, is the inventor of the Smith-Egan beater and also the designer of the recovery unit now being installed.

A number of years ago, Central Paper Company conducted experimental work on bleaching problems common to sulphate pulp, and as a result installed a basic multistage bleach plant. Further research disclosed the advisability of including additional stages, but equipment was not available during the war. These plans are now being completed to make a stronger, better paper.

◆

Washington News

VIEWING PAPER MARKETS

The future of the domestic paper markets is being subjected to varying estimates. The Department of Commerce estimates a somewhat lower output for the three months ending September 30, but the American Paper and Pulp Association's survey of trends (based on the experience of the first six months of the year) leads to an estimate of total supply for the year of 21,245,000 tons. This is an increase of no small proportion over the actual supply of 19,667,211 tons in 1945. The Association estimate places domestic production over all at 18,620,000 tons, plus 3,100,000 tons of imports, presumably chiefly newsprint, and less exports of 475,000 tons.

The import and export estimates are based on three months' experience.

An Associated Press survey of world markets was chiefly confined to newsprint which is in heavy demand in Europe and the Orient, with prices as high as $300 per ton being reported. All estimates for the future, however, must be taken with due consideration for the tonnage of pulp imports which may be expected from Scandinavia. However, it is safe to say that for the "long pull" the domestic industry is competent to meet any normal domestic demand for basic grades, and Canadian newsprint output should not leave an undue crisis facing newspaper publishers.

PAPER CONTROLS

The Office of Price Administration is busily carrying out its efforts to unscramble the price control omelet. A price increase approximately equivalent to the $6.80 advance in Canadian newsprint prices, following revaluation of the Canadian currency, has been granted, the ceiling boost being $7.00.

As this is written, the adjustment of pulp prices to meet the revaluation of Canadian and Scandinavian currencies has not been announced, but some action is daily expected.

During the month following the re-establishment of price controls, a considerable number of price advances were announced. Low priced book and writing paper advances were authorized, ranging, for instance, from $7.00 to $14.00 in writing grades.

Other orders adjusting prices in varying degrees were issued affecting bleached waxing papers, chip and news boards, gummed tape and glazed and fancy papers, and toilet tissues and paper towels. These are only some of the authorized adjustments, but indicate the trend of thought in the OPA.

◆

TEN PER CENT RAISE ON WOOD PULP PRICES—BOTH DOMESTIC AND IMPORTED

An increase of ten per cent in prices for domestic and imported wood pulp was put into effect by the OPA on September 5.

The higher ceiling prices apply immediately to domestic wood pulp production; they also are retroactive on imports to August 8 when adjustable pricing was permitted. It is estimated this change may cost consuming mills approximately $25,000,000 more a year.

[*See Market Quotations in this issue for adjusted pulp prices.*]

◆

CASEIN SHORTAGE, SMALLER DEMAND MAY TURN INDUSTRY TO OTHER RAW MATERIALS

A study prepared by the bureau of economics of the Borden Company and published in the firm's *Economic Digest* predicts that the domestic utilization of casein this year will approximate 60,000,000 pounds, compared with the record high of 90,000,000 pounds used in 1941. It further states that the future of casein as an industrial material is "essentially inauspicious" because of the diminished supply and the lessening demand for it by industrial users.

From the standpoint of supply, casein has become a "shortage material." This is a result of the increased consumption of dairy products exceeding prewar levels and keen competition particularly in the demand for nonfat solids which has converted the supply of available milk to production of by-products other than casein. From the standpoint of demand, industrial users of casein have turned to the use of synthetics, especially in the manufacture of glues, plastics, and fabrics.

The report concludes that casein seems destined to fall among the least economic by-products of milk.

PAPER · · · America's 6th Industry

PAPER SHEETS AND PILLOW CASES

(NEWS ITEM: *Paper may soon replace cloth in the manufacture of sheets and pillow cases.*)

A new paper that can be laundered like cloth, even boiled in soapy water, and then ironed flat is in the offing for sheets and pillow cases in the home of tomorrow. Softness, whiteness and unusual tearing strength are some of the properties of this new paper. It was used during the war principally for military maps.

This new development in papermaking is fully described in an article, entitled "Notes on Resin-Bonded, Wet-Strength Papers", which is available for the asking from Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C.

Paper cord for rug-backing . . . paper bags for garbage disposal . . . paper cans for frozen foods . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for book and high grade printing papers, one for white paper for bags, and one for Kraft liner board; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

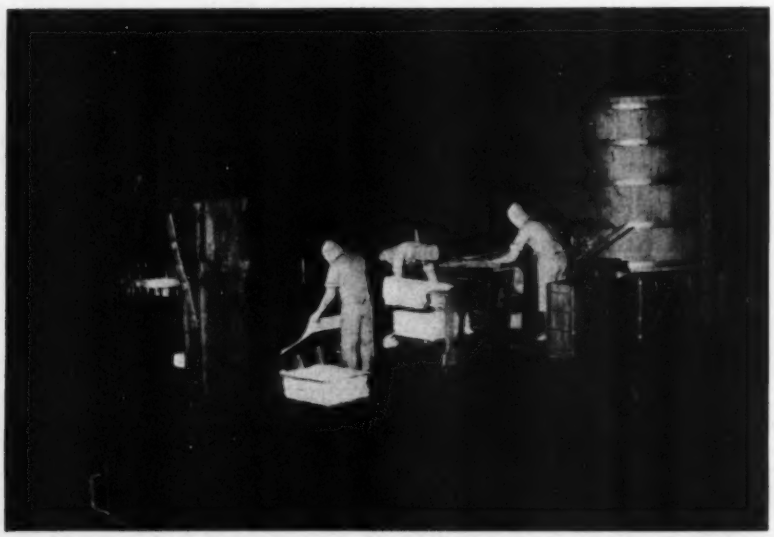
Papermaking museum of Crane & Company at Dalton, Mass., is housed in this building which was the rag room of the "Old Stone Mill," built in 1844

Crane Museum Has Been Re-opened

▶▶▶ AFTER FIVE YEARS of closely guarded wartime seclusion, the museum of Crane and Company in Dalton, Massachusetts, has been re-opened to the public. The museum is located on the grounds of the company's Pioneer mill, where armed guards were posted while that plant filled war contracts for thousands of tons of bond and currency paper. The guards were withdrawn in July.

The Crane museum contains a very complete collection of exhibits depicting the history of the Crane family in papermaking, as well as the industry as a whole. Many new exhibits have been added.

The building which is now the museum originally was the rag room of the old Stone Mill, built in 1844, and was the only part of the mill that remained when it was torn down in 1893. For a while, the rag room was used for storage. In 1929, the second story was taken off and the interior of the building was remodeled. The hand-hewn oak timbers that were used and the floor boards were fastened with wooden pegs instead of nails. In 1930, the building was opened as a museum and remained open from May to October every year until 1941.



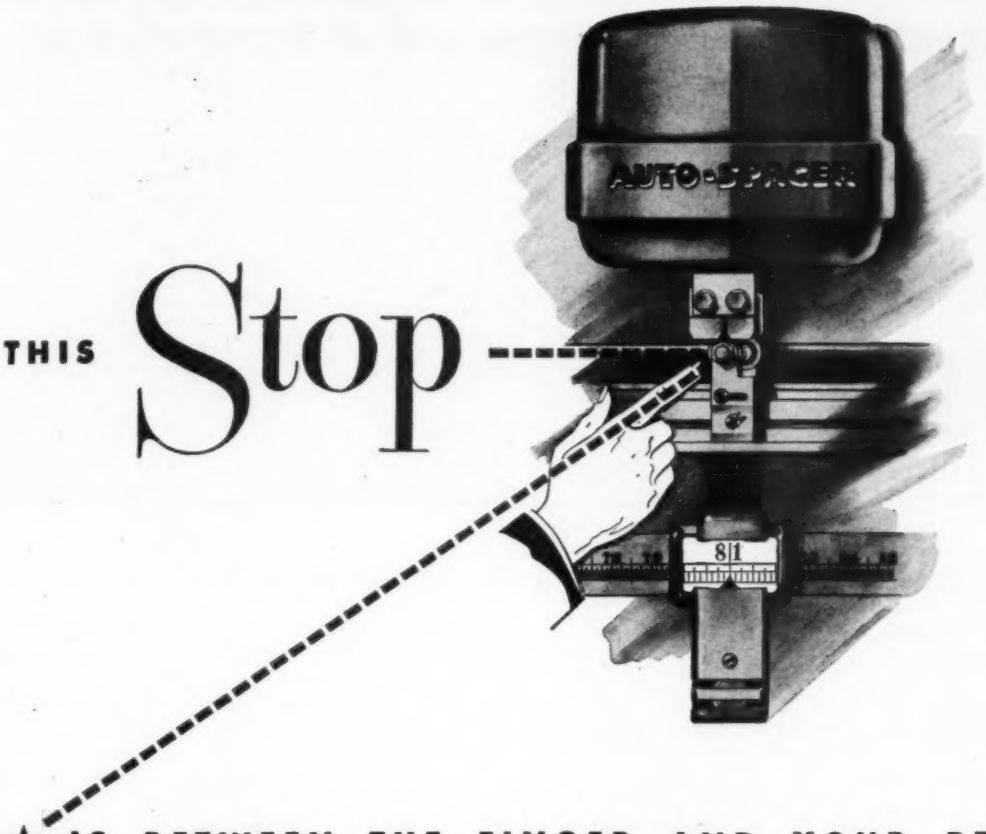
Small scale model of the vat-house in first mill of Crane & Company as it looked in 1801

In the center of the room is a large scale model of the vat house of the first Crane mill in Dalton, built by Zenas Crane in 1801. The wood-carved model shows the figures of Zenas Crane and two workmen making paper before the advent of modern machinery. Mr. Crane is shown in the act of forming a sheet of paper on a hand mold. All the other exhibits are arranged in show cases which in chronological order depict the history of the industry, particularly as it pertains to the Crane mills. Interior furnishings and lighting are of the 19th century period. A large fireplace with a crane and kettle and a nearby spinning wheel illustrate the well-known Crane and Company trade-marks.

One of the exhibits is a ledger from the Liberty mill in Milton (Mass.) operated by Vose, Lewis and Crane from 1770 to 1793. On one page are entries showing purchase of currency paper by Paul Revere, who engraved it for the Colonies. There are photographs in the musem of another early Crane mill in Newton Lower Falls, Massachusetts.

Also on display are old newspapers printed on Crane rag paper and specimens of the paper collars once made in the Crane mills. There is a letter written to the Cranes in 1846 by Henry Clay, an office desk used in the early eighties, and one of the hand molds used by Zenas Crane from 1801 to 1830.

Among the many samples of bank note and currency paper is one that demonstrates the great durability of the Crane product. This exhibit consists of two American Bankers' Association checks which are only slightly frayed at the edges after having been exposed to the weather for ten years. The signatures, in ordinary ink, are still quite legible. The checks were lost by their owner in Montrose, Colorado, in 1919. They were found as part of an eagle's nest in Butte, Montana, in 1929.



★ IS BETWEEN THE FINGER AND YOUR PROFITS

Equipment in your shop operates under an overtone of human efficiency. The overtone contains unpredictable loss. You can calculate the output of any machine, theoretically, but the payoff is influenced by the human hand.

Consider for a minute, the Seybold Mill Spacer of the new Sixty Series. The "cut stops" can be set—at one time—to make all the cuts necessary on several jobs. The back gauge automatically moves the stock accurately into cutting position at a faster rate than ever before. Such engineering is the result of Seybold's sixty years' experience with the men who operate cutters and trimmers.

In the tedious job of positioning the paper for one cut after another, the human element takes its toll of your stock and, so, of your profits.

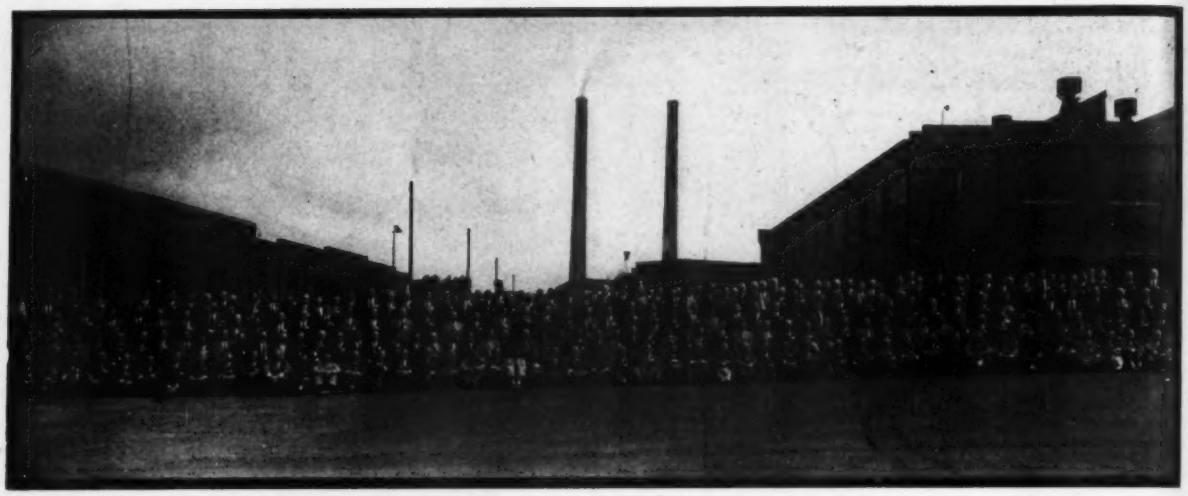
But when the Seybold Mill Spacer permits the operator to make one series of easy adjustments, thus eliminating hours of fatiguing manual labor, that's the result of

ENGINEERING THE HUMAN ELEMENT AT Seybold

HARRIS-SEYBOLD

HARRIS PRESSES ★ SEYBOLD CUTTERS ★ OTHER GRAPHIC ARTS EQUIPMENT

HARRIS-SEYBOLD COMPANY — GENERAL OFFICES, CLEVELAND 5, OHIO



Thirty-third Conference with Hammermill Agents

▶▶▶ A RECORD ATTENDANCE of 190 paper merchants heard details of the Hammermill Paper Company's $6,500,000 expansion program at the thirty-third Conference with Hammermill Agents, held at Erie, Pennsylvania, August 21, 22, and 23. Paper world executives from all sections of the United States and from three other countries were present.

The progress being made in the mill's expansion program keynoted this year's meeting. Welcoming the agents at the opening business session, held in Hammermill's huge new storage and shipping building on August 21, Norman W. Wilson, the mill's president, stated: "This session at Hammermill is tangible evidence that we want you to know how we stand."

Following Mr. Wilson, Donald S. Leslie, Hammermill's first vice president and general manager, spoke in detail about the new buildings now being erected and the new equipment to be installed in them. Future mill plans were discussed so far as these have been projected at present.

After the August 21 meeting, the conference moved to the Kahkwa Club in Erie where business sessions were held on August 22 and 23. Bruce Barton, well-known author and executive in the firm of Batten, Barton, Durstine and Osborn, Hammermill's advertising counselors; and Murray Shields, vice president and economist of the Bank of Manhattan Company, spoke at the Kahkwa Club meetings. Discussing the economic trends of the coming decade, Mr. Shields stated: "We are in a technological revolution in the United States, capable of giving us and our people the greatest period of prosperity the world has ever known."

Harrison R. Baldwin, Hammermill vice president in charge of sales; and A. Ellis Frampton, advertising and assistant general sales manager, also spoke at the Kahkwa Club sessions. Mr. Baldwin reviewed the growth of Hammermill's production since the mill was founded in 1898, while Mr. Frampton discussed Hammermill's advertising as it is related to the current economic picture. During his talk, Mr. Frampton stated: "If we want an America of free enterprise, we must 'free' enterprise."

Other Hammermill spokesmen appearing on the three-day program were: Richard P. Price, vice president and general superintendent; John H. DeVitt, controller; G. P. Bothwell, John D. Zink and William W. Woodbridge of Hammermill's sales department.

On August 20, the Agents' Advisory Committee met with mill officials at Weigelia Lodge, Mr. Wilson's conutry home, for a discussion of the Conference program. Committee members present were: Robert S. Johnston, The Old Dominion Paper Company, Norfolk, Virginia, chairman; Frank W. Holden, The Rourke-Eno Paper Company, Hartford, Conneticut; W. N. Gillett, Chicago Paper Company, Chicago; H. F. Petrequin, The Petrequin Paper Company, Cleveland; George F. Gray, Henry Lindenmeyr & Sons, New York City; H. B. Mayberry, C. M. Rice Paper Company, Portland, Maine; Ralph G. Luff, D. L. Ward Company, Philadelphia, Pennsylvania; H. T. Newell, Jackson Paper Company, Jackson, Mississippi; D. A. Hoadley, Carpenter Paper Company, Omaha, Nebraska; Allan R. Newmark, Zellerbach Paper Company, San Francisco, California.

The assembled Agents elected the following men to serve three year terms on the Advisory Committee: L. V. Mulnix, Carpenter Paper, Company, Grand Rapids, Michigan; Frank H. Winter, Carter, Rice & Company, Boston; Eric A. Rohrer, Swigart Paper Company, Chicago; Allan R. Newmark, Zellerbach Paper Company, San Francisco; Robert S. Johnston, The Old Dominion Paper Company, Norfolk (Va.) was re-elected chairman.

Elected for three year terms on the Paper Committee were: G. E. Caskie, Jr., Caskie Paper Company, Inc., Lynchburg, Virginia; E. A. Damhorst, Irwin Paper Company, Quincy, Illinois; and Thomas S. Lathrop, Lathrop Paper Company, Inc., New York City.

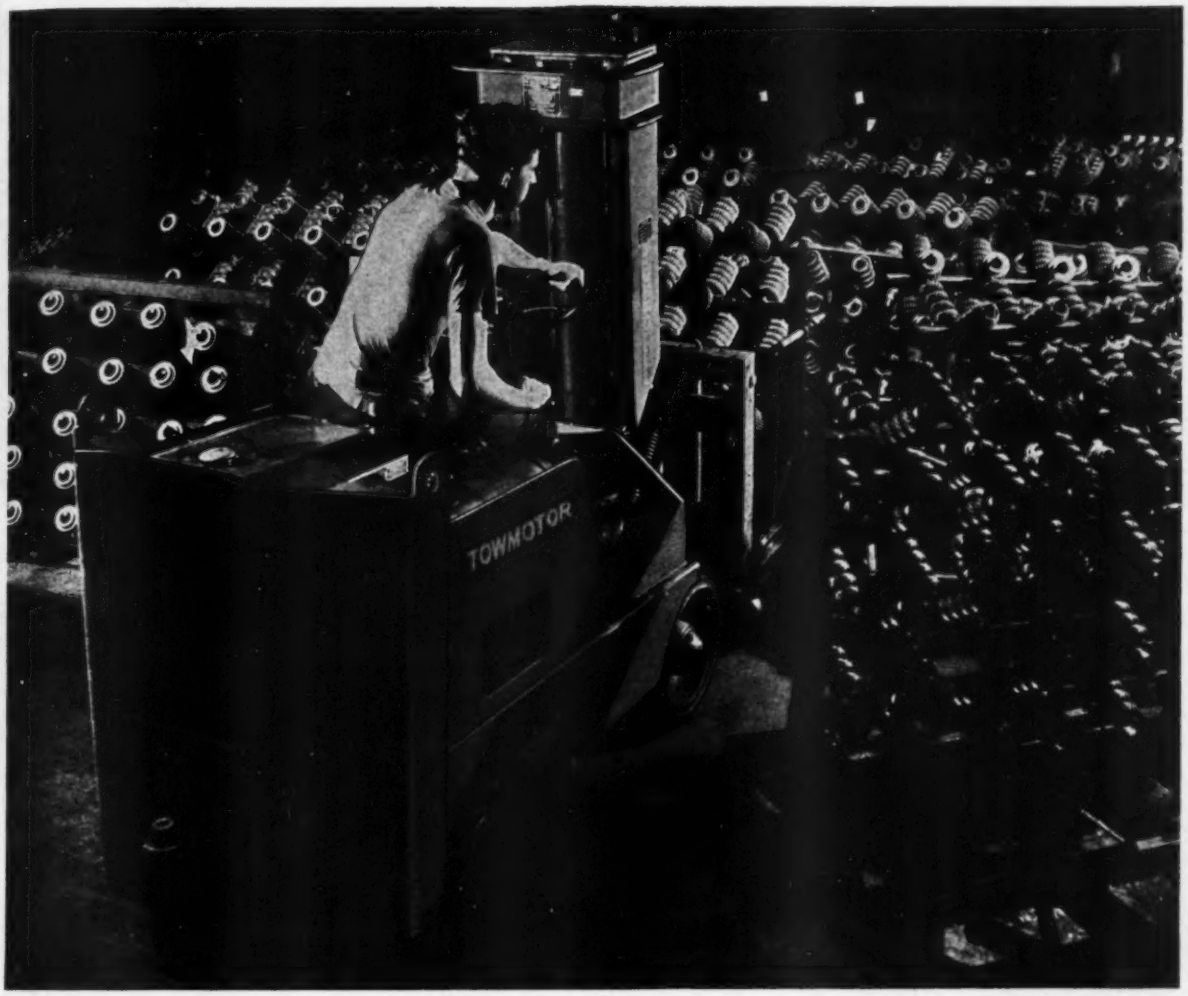
The final two afternoons of the conference were devoted to golf and other games.

◆

FOREST TOTALS GIVEN

Timber equal to the nine year harvest of the 1930s was cut in the national forests of seven Great Lakes and Central states in the fiscal year 1946. This is an all time record and tops the average annual cut during the war by thirty-six per cent.

Jay H. Price, regional forester for the United States forest service at Milwaukee, Wisconsin, reported that 172,894,000 board feet were cut in the period, July 1, 1945 to June 30, 1946. Nearly a quarter of this amount was suitable for home and industrial construction, and about seventy per cent was used for pulpwood and box bolts. More than ninety per cent of the pulpwood and sixty-five per cent of the sawtimber cut in the region was grown in the three lake states of Minnesota, Wisconsin, and Michigan.



GEARED—TO CAPACITY PRODUCTION

MILLIONS OF GEARS—gears of many sizes and shapes, for a large variety of uses—are produced by Warner Gear Division, Borg-Warner Corporation. Mass production of this sort entails numerous handling problems, many of which are effectively solved by a fleet of eleven Towmotors.

On receiving docks, a single Towmotor handles all types of raw materials including 18-foot bar stock, keeps materials flowing to production departments. In the shop, Towmotors tier 5600-lb. loads three high to triple storage space, provide a simple answer to the perplexing problem of transporting 1200-lb. cyanide pots from heat-treating to storage. One unit often does the work of a ten-man gang.

In the shipping department, two Towmotors load 250,000 lbs. of gears daily, in addition to supplying loads for three interplant trucks. And to Towmotor's record for versatility and capacity can be added economical operation . . . operating costs for each unit total only one-quarter of the operator's wage.

For every handling problem, however unusual, there is an engineered solution . . . a solution based on Towmotor experience and "know-how" gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE. Towmotor Corporation, 1220 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

The Superior National Forest in Minnesota, produced 51,606,000 board feet. Wisconsin's national forests cut approximately 32,000,000 board feet. In Michigan, the total approached 50 million board feet.

◆

BYRON WESTON CO. LAUNCHES MILL IMPROVEMENT PROGRAM

At ground breaking ceremonies held at Dalton, Massachusetts, Hale Holden, Jr., president of the Byron Weston Company, announced an extensive program of mill improvement with construction beginning immediately on a new finishing machinery building.

The first phases of the improvement program have been accomplished with the installation of a new Bird Screen on the 112-inch machine. Installation of a new Victory beater is nearing completion. The design of the beater is of the most modern type permitting the simultaneous treatment of different sorts of fiber requiring different beating time. The beater is also equipped with automatic devices which maintain precision control during the entire beating process.

With the construction of the new finishing machinery building 25,000 square feet of floor space will be added, and will connect the existing units of the plant. The additional floor space will allow the more efficient arrangement of calenders, trimmers, and other finishing equipment.

After CPA approval to begin construction was obtained a few weeks ago, this phase of the modernization program proceeded. Completion of the mill improvement project is expected to take several months. The results will be streamlined plant layout and modern production facilities will increase the speed, efficiency, and production capacity of the mill. The Weston Company manufactures cotton fiber ledger index, bond, and machine accounting lines of paper.

◆

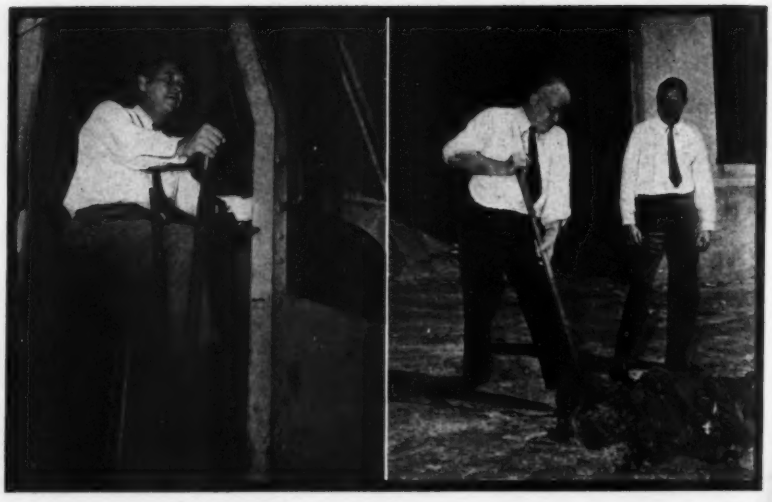
ITALIAN PAPER NOTES (July, 1946)

Under a decree of May 29, a Central Commission was established at Rome to regulate the distribution of newsprint on rolls. The Commission is made up of eight representatives of the newspaper editors. Also, Regional Commissions were established to regulate the local distribution of newsprint in all Italian communities. At Milan, an information center has been developed to supply the Central and Regional Commissions with necessary data.

The Central Commission investigates the price of Italian domestic and foreign newsprint. The disposition of the newsprint and the rules governing the prices of daily journals are regulated by the Commission, and recommendations are made to the President of the Italian Council of Ministers which stipulate the number of pages which may be used by the journals. All requests for newsprint in rolls must clear the Regional Commissions. Any refusal by the Regional Commissions to issue newsprint can be appealed to the Central Commission. The decision of the Central body is final.

Representatives of the Italian Association of Paper and Cardboard Producers, the Association of Paper Wholesalers, the Association of Industrial Graphic Arts, and the Association of Italian Editors met in Milan to discuss the abolition of the Corporation of National Textiles, and to protest the decision of the Ministry to reduce the subsidy paid to the National Corporation of Cellulose and Paper. The reduction of the subsidy is considered harmful to the development of the Italian paper industry.

The reduction which resulted from the agreement between the paper mills and the journals produced repercussions in other industries which brought about the following quotations: Printing paper in rolls, or in sheets, 75 to 80 lire per kilo; writing paper in rolls or sheets, 85 to 90 lire; ordinary packing paper, 50 to 60 lire. It is possible that a decree will be issued which will affect the type of paper to be used in school children's copy books, the number of pages allowed, the ruling of pages, etc. This decree is directed toward a price reduction in other paper.



LEFT—Hale Holden, Jr., president of Byron Weston Company, is shown breaking ground for a new finishing machinery building, part of the extensive mill improvement program launched recently by the Weston company. . . . RIGHT—Leonard P. Taylor, mill superintendent, prefers the old-fashioned method of breaking ground. President Holden watches him, comparing the old and new methods

Business and trade in all types of paper is small since the supplies on hand are limited. Prices are also higher than in preceeding weeks. Another factor which will affect all industry is the threatened coal shortage. Any reduction in industrial activity, in the paper industry or any other, will result in higher prices.

◆

FIBREBOARD PRODUCTS CO. EXPANDING ON WEST COAST

An expansion program which will take three years to complete, and which will involve a 24-million dollar investment has been announced by D. H. Patterson, president of Fibreboard Products Company, San Francisco.

Work is already under way in California, Oregon, Washington, and Nevada. When the expansion project is completed Fibreboard will have seven paperboard mills and nine converting mills, seven in the San Francisco Bay area, and five in the Seattle-Portland area, and four in the Los Angeles area. Financing for the expansion program is complete. When in full operation approximately 6,000 persons will be employed by Fibreboard.

The largest of the new plants will be constructed near the parent plant. An island totaling 155 acres together with 95 acres of mainland have been purchased for this construction. The plant will be a two-machine board mill and converting plant. It is expected to add 200 tons a day to existing capacity.

The company has acquired the facilities of the Cresent Logging Company and thousands of acres of timberland

You Can Use This
BIRD CONSISTENCY REGULATOR

— ahead of your paper machines, your Jordans, your knotters—wherever uniform consistency means better paper at lower cost.

Dependable, positive and instantaneous in action the Bird Regulator holds consistency to a hair—not more than 0.1% heavier or lighter than the consistency desired whether it be less than 1% or as high as 12%.

Let us mail you the new Consistency Regulator Bulletin illustrating and describing a wide variety of applications.

BIRD MACHINE COMPANY
SOUTH WALPOLE · MASSACHUSETTS

on the Olympic Peninsula of Washington to supply its expanded production plants.

Subsidiary companies of Fibreboard are also taking part in the expansion program. Nevada Silica Sands, Incorporated, is building a new plant at Overton, Nevada, to supply glass sand to Glass Containers, Incorporated at Antioch, Nevada.

◆

FLORIDA PULP & PAPER CO. KEYNOTES OPERATIONS WITH ECONOMIC FIXATION THEME

Subsequent to the recent acquistion of the Florida Pulp and Paper Company (Pensacola, Fla.) by St. Regis Paper Company, J. H. Allen, president and general manager of the Florida company, gave out the following statements in an interview:

"Economic fixation" is the operating theme of the Florida Pulp and Paper Company, Pensacola, Florida. J. H. Allen, president and general manager, declared, "We are not thinking merely of tomorrow or next year. We are planning to harvest crops in Florida century in and century out. We are planning for permanent economic fixation."

Mr. Allen predicted a profitable future for the timber farmers of Florida, and he said he believed that the tree farmers would step up their production of new crops of timber, to the end that there always would be plenty of timber in the South, to supply the needs of our nation with pulp and paper.

"For the past 25 years," he declared, "we have tried to increase the utilization of pine trees. We have tried in every way, to encourage the southern farmer to raise more pine trees. From 50 cents a cord, not many years ago, the price has increased to $2.00 and $2.50 a cord. It costs the farmer less than 60 cents an acre to raise these pines. This profit incentive will raise timber.

"We have 15,000,000 acres of land in Florida raising pine trees. All we have to do is keep the fires out, and, then, throughout the future, log these timber farms selectively, and a permanent income will be established in this tree-raising agriculture department. The farmers are just beginning to realize that there is to be good money in raising pine trees. It is up to these tree farmers to realize that it is they who must raise timber, not only for the mills that are in the South today, but to take care of the expansion that is to come in the future.

"Here at the Florida Pulp and Paper Company we are not quarter-century minded but century minded. We're planning far into the future."

In less than five years, Mr. Allen declared, the company will have a payroll, in the woods and in the mills, of between $5,000,000 and $6,000,000 in wages alone. This does not include salaries to executives and departmental heads. The company, he said, will employ about 4,000 men and women. In the years to come, "We hope to add a permanent community of 20,000 people to the Pensacola area."

Speaking on the same subject, R. K. Ferguson, president of St. Regis Paper Company, said:

"All signs point to continued increased demand for multiwall paper bags," Mr. Ferguson said. "Their established uses, for packing cement and other rock products, fertilizers, agricultural commodities and chemicals, will require greater volume as these basic industries step up to meet demands of the postwar era. Further stimulation will come through the current and prospective development of new filling machines, which, in conjunction with the multiwall bags, will offer mechanized packing operations to a wider range of industries."

The new kraft paper mill of the Alabama Pulp and Paper Company, with a potential daily output of 250 tons, is now under construction at Atmore, Alabama, near Pensacola, and is expected to be in operation by December 1947. The plant is specially designed for manufacture of heavy duty multiwall bag paper which will be sold under long term contract to St. Regis. (Cf. P.I. and P.W. April and June, 1946.)

◆

BRITISH PAPER NOTES (July, 1946)

As was anticipated the present license period in the British Paper Trade is proving one of even greater stringency, in the direction of paper supplies, than previous periods. Everyone concerned, however, has now become resigned to the position and while making the greatest use of the paper available is looking forward to the next license period when it is hoped that the first signs of a real turn in the tide will be apparent.

This expectation of good things "tomorrow" and its consequent present feeling of apathy not only affects the paper trade but also other industries. This is a most unhealthy sign and is the result of the overwhelming forces ranged against individual initiative. It is impossible to move in any direction of expansion for if, after months of effort, a license is obtained to purchase a small piece of machinery, however small, it is more often than not unobtainable for the simple reason that the particular industry supplying the article is suffering from the same disease of procrastination.

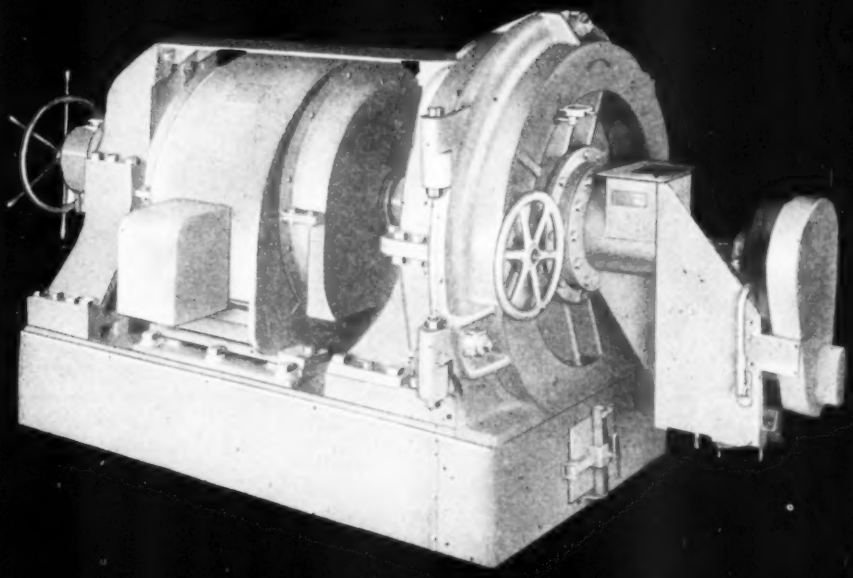
The classic example in the paper trade is the newsprint ration issued to the national and local newspapers. For the past nine months the newspapers have been pleading for an increased supply of newsprint and although stocks in hand are gradually increasing there are no signs of a bigger allocation. Despite the fact that a government official promised greater supplies by the end of July; a promise which was promptly denied by another government official, it is now being suggested that the early autumn *may* see an increase in allocation. Meanwhile plans for expansion both by newspapers and the larger journal publishing houses are held in abeyance, and prospects of heavy unemployment in these sections are increasing. From this lack of newsprint supplies and the recent attack on the press one is at liberty to draw his own conclusions.

Unfortunately the views of the leaders of the trade, speaking on the world wide situation, do not hold out any hopes of an early improvement. It is still the considered opinion that sufficient newsprint alone to satisfy world needs will not be available within the next three years.

The real crux of the situation, on this side, is coal. The Scandinavian countries are in urgent need of British coal which is not forthcoming despite the suggested advantages to the British coal miners of the nationalization of the coal mining industry. Until this country is in a position to renew its prewar exports of coal to Norway and Sweden those countries cannot regain their pre-war production of pulp and paper. So desperate has the position become that many Swedish mills are installing oil burning plants which will ultimately prove to the disadvantage of the British coal mining industry.

The extremely slow progress of the British paper trade towards prewar levels is confirmed by the Board of Trade returns just issued covering the first half of the present year. The imports of paper-making materials are less than 45% of 1938. Although, considering world conditions, this may appear fairly satisfactory it has to be remembered that during the first six months of 1945, when the European war was in progress, Great Britain was importing half the present total of materials. In effect a year of peace in Europe has witnessed the small increase from 23 to 50%. The imports of paper and boards are approximately 25% of the prewar, but a large percentage of this is represented by wallboards, needed for the housing pro-

ECONOMY THRU EFFICIENCY



A relative newcomer . . . the new, improved Sprout-Waldron 36-2 Refiner has proved outstandingly efficient and economical in the pulp and paper field.

Capable of all operations from a straight defiberizing program to the actual refining of already processed fibers for fine papers, the Sprout-Waldron 36-2 Refiner is particularly well adapted to the following applications:

1. Reducing semi-chemical pulp chips in stage operation to finely divided fibrous form.
2. Reducing groundwood rejections.
3. Reducing sulphite and kraft knots and tailings.
4. Processing kraft pulp on cycle for condenser papers.
5. Professing flax pulp on cycle for cigarette papers.
6. Processing sulphite pulp on cycle for glassine and waxing papers.

SPROUT-WALDRON & CO.

Manufacturing Engineers

MUNCY PENNSYLVANIA

gram, the imports of which now stand at 140% of 1938.

Exports of paper and boards have passed the 50% mark but in view of the fact that it is extremely simple to sell in the export market today the figure of 50% is not very satisfactory. These exports are producing three times the amount of money they did in 1938 and the tendency is for prices to advance still further.

The present paper price position is causing extreme concern to many members of the trade. Further advances in the costs of coal and transport have recently been granted, and, a few days ago, it was announced that substantial upgradings in wages have been agreed between the employers and the unions. All of which will need to be covered by advances in selling prices.

◆

K-C LAKEVIEW MILL NOW MAKES ONLY CREPED WADDING

Papermaking operations at the Lakeview mill of Kimberly-Clark Corporation in Neenah, Wisconsin, were discontinued the last of August.

In the change-over, the No. 2 specialty paper machine was dismantled to make room for the new modern creped wadding machine. With the completion of some additions, the Lakeview mill becomes a creped wadding mill.

Since 1929 when the Lakeview mill was purchased by K-C from Sears, Roebuck and Company, the No. 2 machine has operated continuously. At the time it was purchased, the mill consisted of two paper machines. Five years later, No. 1 machine was removed and No. 1 and 2 creped wadding machines were added.

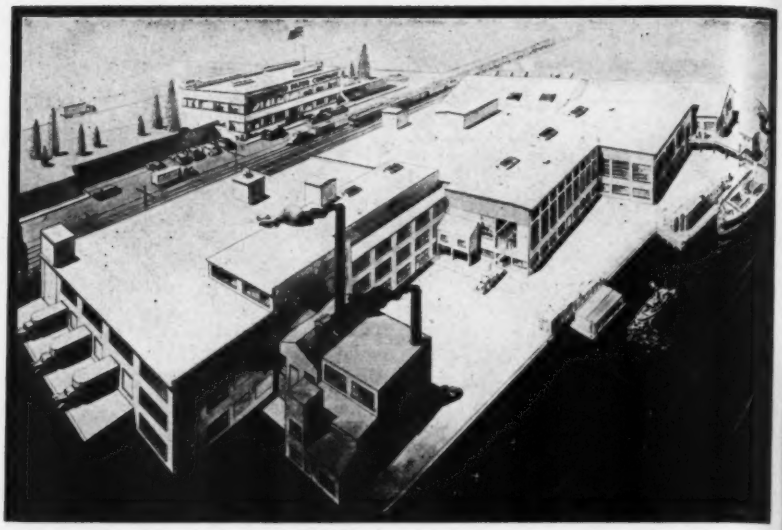
◆

TEXTBOOK SALES REACH HIGHEST HALF-YEAR MARK

A report from the publishers given out by the Joint Textbook Committee of the Paper Industry, New York City, states that sales of the textbook on the *Manufacture of Pulp and Paper* ran higher during the first half of 1946 than in any six-month period since 1929.

As Volumes III, IV and V already have undergone two revisions, it is the third edition which is now selling. These three volumes are now undergoing further revision. It is the intention of the Joint Committee of the United States and Canadian Pulp and Paper Industry which originated and has sponsored this undertaking during the past twenty-eight years, to keep these textbooks abreast of a constantly growing industry.

The original Volumes I and II which cover the preliminary sciences are considered no longer necessary because of the general advance in education throughout the world. Consequently, they will ultimately be dropped from the series, and when the present revision is completed, the new set of volumes will be confined entirely to pulp and papermaking methods, processes and applications.



Artist's concept of the Westminster Paper Company's new plant on the Fraser River at New Westminster, British Columbia. In the foreground (left of center) is shown the new steam generating plant announced recently

◆

COTTAGE SETS ADDED TO PAPER CURTAIN DESIGNS

Fabric shortages throughout the nation have brought into use many substitutes. Paper curtains have not only filled a great need but have won a permanent place in many homes of the country.

Clopay Corporation, of Cincinnati, has recently introduced a new line of cottage style paper curtains which are very colorful and economical. These practical curtains come in polka dot, strawberry, and gingham patterns. The polka dot and gingham patterns are printed in red, blue or green; the strawberry pattern comes in a combination of red and green. The curtains are strong, grease and water resistant, and can be cleaned with a damp cloth. A fabric effect is given by the thread-like underprint.

◆

TREE FARMS GROW PAPER

A publication entitled "Growing Paper on Tree Farms," was issued recently by the Crown Zellerbach Corp., main office, San Francisco.

Since the very beginning of wood use in the manufacture of pulp and paper in the states of Washington and Oregon, the publication points out that Crown Zellerbach has practiced forestry. The company now has five tree farms in Oregon and three in Washington, located in proximity to its five operating pulp and paper mills in the Pacific Northwest. Total of the land involved is about 500,000 acres. It has been estimated that planted in a single strip one mile wide, these timberlands would reach from Seattle to San Francisco, a distance of about 900 miles.

A foreword to the booklet declares: "When man harvests mature trees for useful purposes, he takes the first step towards wise use of the forests. For in most cases, these mature trees have passed their peak of growth and are simply taking up space in the forests which could be untilized by younger, growing trees. The next step is most important, since it involves

from PULPWOOD to FINISHED ROLLS

It's a NORTHWEST JOB!

NO other type of equipment could handle this job so smoothly. Your Northwest will go anywhere. It handles pulpwood in the yard, piles high or low, dumps in the pond, unloads or loads cars or trucks. There are no delays, no switching empty cars out of the way, no awkward unloading from the end, no need for an extra line of track.

When pulp requirements are taken care of your Northwest can load finished paper, cases or rolls, handle coal or ashes at the power plant and aid in new construction.

Northwests are simple to operate, easily and economically cared for. Such features as the "feather-touch" clutch control, the cushion clutch, uniform pressure swing clutches, Northwest steering, the helical gear drive and many others combine to give you advantages not found in other machines.

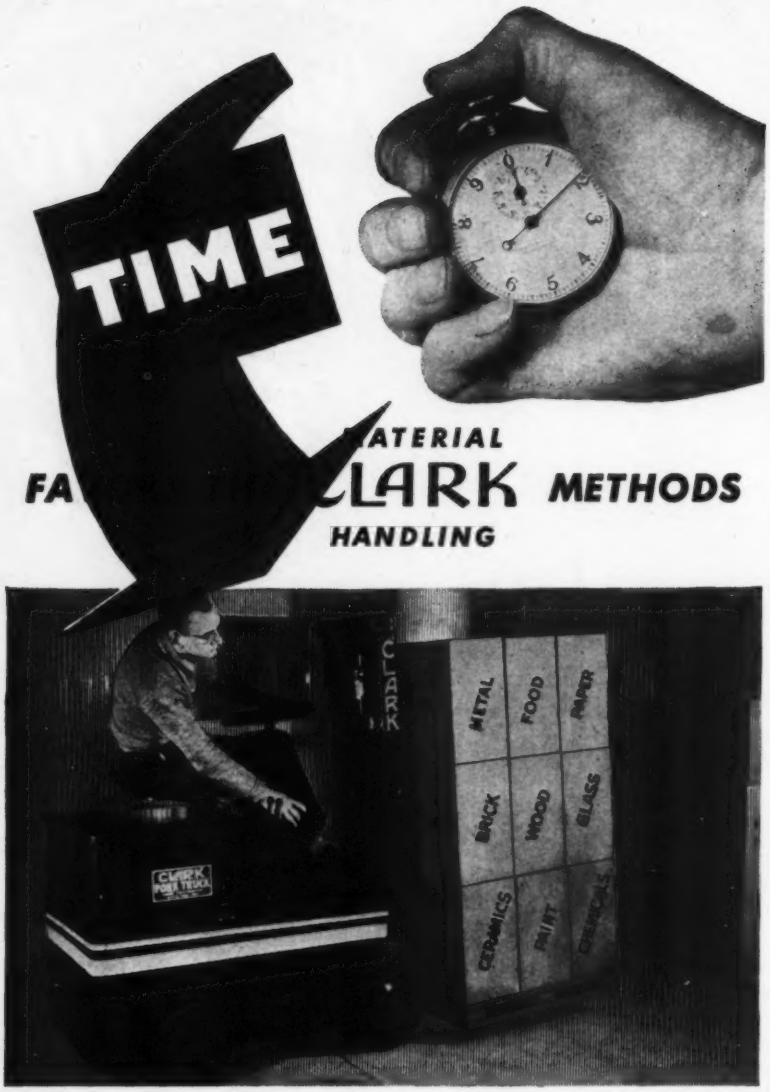
With a Northwest you have no water or boiler troubles, no ash problem, no banking of fires or steaming up in the morning and when the engine stops operating expense stops.

Now is the time to modernize your pulpwood handling set up. Many mills have found that Northwests have reduced their costs. Let us tell you more about them. There is a size for every problem—4 to 44 tons.

NORTHWEST ENGINEERING CO., 1821 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

NORTHWEST

The Crane that GOES ANYWHERE



Time is money—save it by use of the CLARK Trucloader, newest of the Clark line of industrial haulage vehicles. Light, compact—yet sturdy as the famous Clipper, Carloader and Utilitruc. Let a Clark Field Engineer plan for you an efficient method of material handling—today!

Write for "Trucloader Broadside," it's free.

LIFTS – CARRIES – TIERS

GAS OR ELECTRIC POWERED

Prices on CLARK products will not be advanced in excess of increased costs

CLARK TRUCTRACTOR

Division of CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN

OTHER PLANTS - BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Other CLARK *Products*

FORK LIFT TRUCKS
DUMP & SHOVEL TRACTORS
RAILWAY TRUCKS
METAL SPOKE WHEELS
TRANSMISSIONS
AXLES AND HOUSINGS
DRILLS & GEARS
ELECTRIC STEEL CASTINGS

what man himself is doing to help. Nature grows new crops of trees on cutover lands. The U. S. Forest Service, State Forestry Departments, Indian Forest Service, Soil Conservation Service and forward-thinking private forest operators are working towards making the soil permanently useful by growing successive crops of new trees. This is the story of how one large pulp and paper company is growing paper on tree farms."

◆

PROFESSIONAL FORESTERS ON CONSTANT GUARD OVER NATION'S LUMBER SUPPLY

Few professions demand of the people engaged in them such a continuous and concerted effort for the public welfare as does the forestry profession, according to the New York State College of Forestry at Syracuse, New York.

In order to obtain the wood necessary for use in home construction, as well as the supply necessary for the 5,000 other uses to which timber is put, requires continuous production of vast timber supplies. This requires that the professional forester wage a constant warfare against insects and diseases which destroy timber, and requires that he undertake the management of forests for the maximum protection against fire and the maximum effectiveness of conservation techniques. Through the efforts of the professional forester the production rate of necessary timber is kept up.

The responsibility for the preservation of timberland is also the responsibility of the public. The welfare of all the people demands an understanding of forest conservation principles to abate the destruction of valuable timber in face of the already acute shortage.

◆

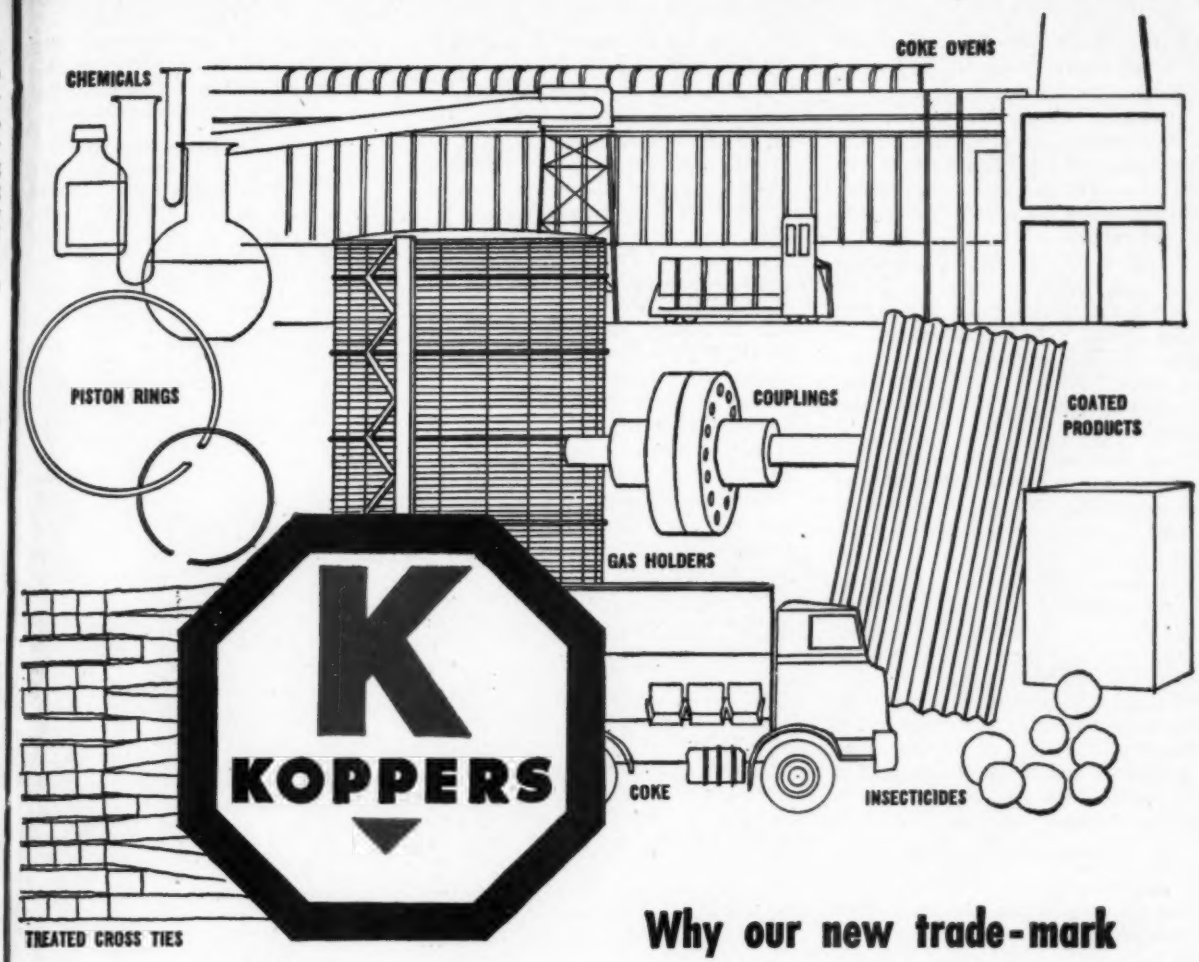
FINANCIAL

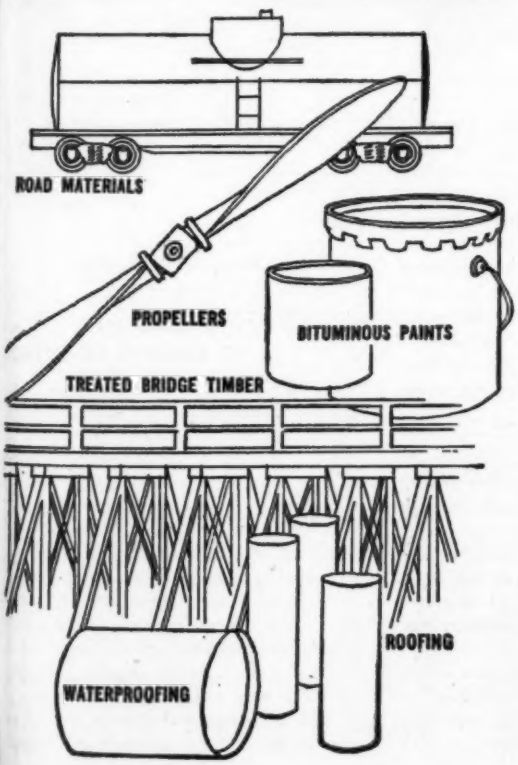
▶▶▶ While the securities markets had their ups and downs during July and August, paper mill securities were uniformly higher at the end of August than a month earlier.

Stock Flotations

Brown Company — Arrangements have been completed for the refunding of its indebtedness to the R.F.C. at lower interest rates and less onerous repayments by a serial bank loan of 2⅝ per cent of $1,500,000 due 1948 to 1952 and an issue of 3⅜ per cent sinking fund bonds due 1961 of $4,850,000.

Champion Paper & Fibre Company —Directors will recommend to the annual meeting of stockholders that the present stock be split on a basis





Why our new trade-mark is important to you

Every day, you place your health, your safety, your children, even your life at the mercy of manufacturers whose products you trust.

Often you do it because of some small mark which doesn't actually say anything in words, but which says volumes in the meanings you read into it.

That's what trade-marks mean to the American people. In effect, the trade-mark says, "Here is a manufacturer who is so sure of this product that he puts his name on it."

That's why our new Koppers trade-mark is important to you.

There are dozens of Koppers products; there will be dozens more as opportunities expand in the rapidly growing chemical field.

Often you will not be able to see the Koppers label on those products—you can't see it, for example, on road paving material or on a bottle of medicine—but the roadbuilder sees it and the medicine maker sees it, and their confidence in it is your safeguard.

Koppers also is well known as a dependable source for many other products and services which we furnish directly, such as the design and construction of coke ovens, roofing material, piston rings, couplings, propellers for your private plane, coke for your furnace, moth balls for your clothes, paints, pressure-treated wood and scores of others.—Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pa.

KOPPERS—THE INDUSTRY THAT SERVES ALL INDUSTRY

of two shares for one. There are 756,000 shares authorized and 551,000 outstanding.

Container Corporation of America—Stockholders have purchased 130,150 shares of a new issue of 141,496 shares at $42 per share. An underwriting group has offered the balance to the public.

Hudson Pulp & Paper Corporation—A group of underwriters has placed the previously announced $3,000,000 issue of 3½ per cent debentures on sale. This is in addition to an offering of 100,000 shares at 5 per cent cumulative $25 stock sold in March of this year.

International Paper Company—The entire bank loan of $15,500,000 used to redeem the Canadian International Paper Company 6 per cent bonds has been paid in full.

Nekoosa-Edwards Paper Company—An underwriters syndicate is offering 63,000 shares of $25 common stock of the Nekoosa-Edwards Paper Company at $26.75, subject to rights of present holders to buy one share for each four now held. The added funds will be used to increase wood inventories and to improve Canadian timber holdings and for general corporate purposes.

Corporation Earnings

American Writing Paper Corporation—Net income for the first half of 1946 was $122,059 as against $79,435 in the same period 1945.

Brown Company—The reported net profit of $879,868 was made by the Brown Company, after making provisions for taxes and other charges. This report covers the 28 week period ending June 15. All subsidies on certain grades of pulp terminated June 30.

Champion Paper & Fibre Company—Net income for the fiscal year ending April 28 was $2,057,444 as compared with $1,803,864 for the previous fiscal year.

Eastern Corporation—Net earnings for the six months period ending June 30 were $340,253 as against $242,012 for the first half of 1945.

Fort Wayne Corrugated Paper Company—Net income for the first half of this year was $563,967 as against $163,385 a year ago.

Gaylord Container Corporation—Net profit for the first half year was $1,798,737 as against $661,847 for the same period in 1945.

Great Northern Paper Company—Net income for the six months ended June 30, was $981,985 as against $637,164 for the same period in 1945.

Hinde & Dauch Paper Company—Net income for the first half of 1946, was $856,916 as against $656,630 for the first half of 1945.

Hudson Pulp and Paper Company—For the nine months period to May 31, the net income of $323,878, equal to $3.24 a preferred share, was reported. This is compared to $342,913 earned in the full year ended August 31, 1945.

International Paper Company—Net profit for the six months ending June 30, was $11,477,418 including earnings of foreign properties, as against $4,411,071 for United States Properties in only the first half of 1945, and foreign earnings of the first half of 1946, of $1,954,936.

Keyes Fibre Company—Net profit for the first half of this year was $89,239 as against $134,880 for the first half of 1945.

Kimberly-Clark Corporation—Net income for the six months ended June 30, was $1,579,020 as against $1,398,493 for the first six months of 1945.

Lily-Tulip Cup Corporation—Six months net profit was $477,913 against $427,299 for the first six months of 1945.

Minnesota and Ontario Paper Company—Net income for the first six months of 1946 was $1,004,414, compared with net income last year of $529,296.

National Container Corporation—Net earnings for the six months ended June 30, were $1,740,069, compared to $632,373 a year ago.

Oxford Paper Company—Net income for the first half of 1946 was $748,684 as against $444,914 for the same period in 1945.

Paraffine Company—Net income for the fiscal year ended June 30, was $1,014,548 as against $1,948,481 in the preceding year. Much of the drop was due to a prolonged labor dispute.

Puget Sound Pulp & Timber Company—Net profit for six months ended June 30, was $347,838 as compared to $211,413 earned a year ago.

Scott Paper Company—Net income for the first half of 1946 was $859,724 as against $657,544 for the same period in 1945.

Soundview Pulp Company—Net earnings for the first seven months of 1946 were $945,993 or $1.78 a share, compared to $474,238 and $.82 earned in the same period of 1945.

Tomahawk Kraft Paper Company—Net income for the year ended May 31, was reported at $285,591 as compared with $229,585 for the previous fiscal year.

Union Bag & Paper Company—Net earnings for six months were $2,347,935 as against $1,047,300 a year ago.

U. S. Envelope Company—Net earnings for the first half year were $330,302 as against $483,954 for the same period in 1945. Manufacturing costs are credited with the decline.

New York Stock Exchange—Stocks

	Closing Prices August 26	July 25
A.P.W. Products	7½	7¾
Celotex	30⅜	30½
Same Preferred.	*21¼–21¾	*21⅝–22
Certain-teed Prod.	22⅜	22
Champion P&F Co.	58¼	51¾
Same Preferred.	*111⅜–112	110½
Container Corp.	44¾	46
Cont. Diamond	13	12⅜
Crown Zellerbach	33¾	33
Same Preferred.	*109–109½	109⅛
Same $4 Pref.	128½	*123–124
Dixie Vortex	44½	41
Same "A"	53½	*55–57
Robert Gair Co.	9⅞	10¼
Same Preferred.	20⅝	20⅛
Gaylord Container.	19½	18½
Same Preferred.	*108–117	*108–116
International Paper.	48⅜	46
Same $5 Pref.	124¾	118⅛
Same $4 Pref.	*108–110	103
Kimberly Clark (New)	30	...
McAndrews & Forbes	40	39
Mead Corp.	25	25
Same New Pref.	107½	...
Masonite	65½	63
National Container.	33	30
Paraffine Cos.	*72–76½	78½
Same Preferred.	*111–115	119
Rayonier, Inc.	24½	25½
Same Preferred.	37⅞	37¾
Scott Paper	*57–59	57
Same Pref.	*106¾—107¾	*107—109
Sutherland Paper	47¾	44¾
United Wall Paper.	10½	...
Same Preferred.	50	...

New York Stock Exchange—Bonds

Abitibi 4%	...	112
Celotex 3¼%	...	105½
Certain-teed Prod. 5½%	...	...
Champion P&F Co.	...	...
International Paper 5%	101⅜	...

New York Curb Exchange—Stocks

Am Writing	10½	9⅜
Great Northern	45⅜	40
Hummel Ross	15¾	...
St. Regis	12⅜	12⅛
Taggart	...	...

*Closing Bid and Asked Prices

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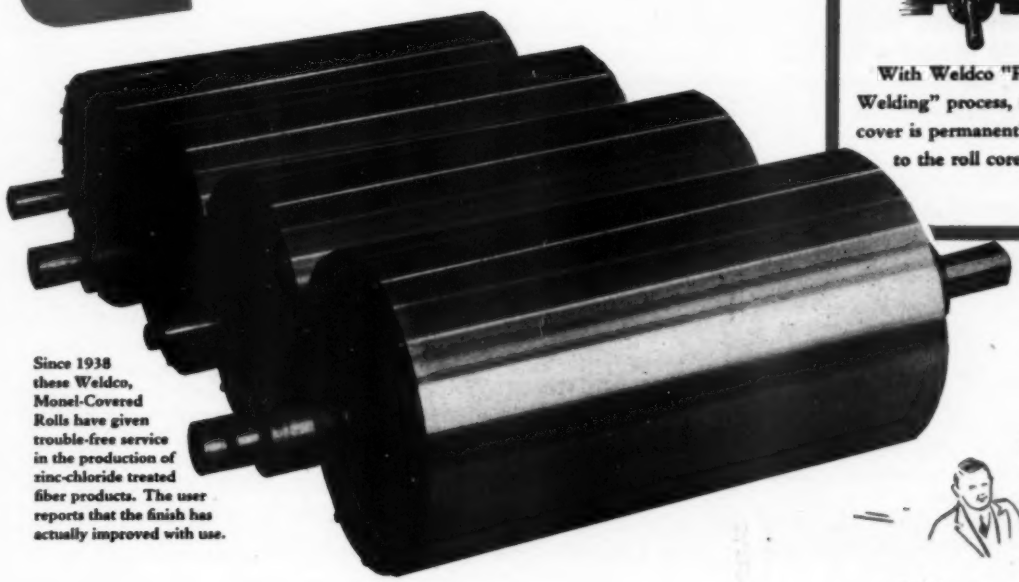
GOULD PAPER COMPANY TO EXPAND FACILITIES

R. W. Shaver, vice president and general manager of the Gould Paper Company at Lyons Falls, New York, has announced an extensive construction and expansion program now under way. Immediately after the Continental Can Company acquired the stock of the Gould Paper Company, engineering studies were made of the rehabilitation and expansion necessary to make this company one of the foremost producers of groundwood specialties and sulphite papers for the printing and converting trade.

The construction project calls for new sulphite and groundwood stock

Ask any paper mill machinery manufacturer this question

With Weldco "Pressure Welding" process, the roll cover is permanently fixed to the roll core.



Since 1938 these Weldco, Monel-Covered Rolls have given trouble-free service in the production of zinc-chloride treated fiber products. The user reports that the finish has actually improved with use.

Are Weldco, Monel-Covered Rolls profitable to the mills that are now using them? . . . that is the question. Ask any paper mill machinery manufacturer, WHY . . . will they last as long or longer than other covers . . . do they do as good or a better job? Ask the manufacturer if he knows of as good or better combination of material and process to give covered rolls longer, more trouble-free life?

If you would like to have rolls reclaimed with Monel covers, or new Weldco, Monel-Covered Rolls, after you have asked these and other questions, any of the following machinery manufacturers will gladly quote you. All of them have furnished Weldco, Monel-Covered Rolls on their paper mill machines.

Beloit Iron Works	Beloit, Wisconsin
Black-Clawson Co.	Hamilton, Ohio
The Bagley and Sewall Co.	Watertown, New York
The Downington Manufacturing Co.	Downington, Penna.
Pusey and Jones Corp.	Wilmington, Delaware
Rice Barton Corp.	Worcester, Massachusetts

THE YOUNGSTOWN WELDING & ENGINEERING CO.
3750 OAKWOOD AVE., YOUNGSTOWN, OHIO

WELDCO

systems, water filters, save-alls, rehabilitation of paper machines, new finishing storage buildings, new offices and a new high pressure steam plant with steam power turbines.

Contracts will be let as soon as materials and equipment are available. The complete program will involve about two million dollars investment.

The increased production resulting from these improvements will eventually increase the annual sales of the company from $1,200,000 to $4,500,000 and there will be a material increase in the number of skilled laborers to run the operation.

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NEKOOSA-EDWARDS TO HAVE ENLARGED MODERN OFFICES

Excavation has been completed preparatory to the construction of an addition to the mill office of the Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin. Modernization of the present structure is also planned. The new addition will provide more office space for the technical and personnel administration departments and additional work space for the laboratory. Other departments in the building are also expected to benefit from the improved space arrangement.

The addition will be in the form of a two-story wing joining the northeast corner of the present structure. The entire front of the building will be remodeled and styled to conform with modern architectural design.

The building construction will be of wire-cut brick. Glass block windows will be used throughout, and the area between the windows will be made up of limestone spandrels. A ventilator unit will be used in each unit to provide clear vision while eliminating heat loss and infiltration of dirt. The entire addition will be air-conditioned with a separate circulating system for the laboratory to avoid the recirculation of fumes and gases.

The lower floor of the new addition will consist of three new offices to be occupied by the department of personnel administration. This will relieve a congested situation and improve the operating efficiency of the department.

The upper floor of the new section will be turned over to the technical department for additional laboratory area and office space. Research and development work will be conducted in the laboratory section.

Three new offices will facilitate the administrative work of the technical department which at present is handicapped by overcrowded conditions. The technical department will also have a new photographic dark-room.

Departments now housed in the mill offices are personnel administration, timekeeper, health and safety, engineering, light and power, technical, research, manufacturing, and the central telephone office.

◆

POLYTECHNIC INSTITUTE OF BROOKLYN TO OFFER GRADUATE PAPER COURSE

Graduate study of Pulp and Paper Technology at the Polytechnic Institue of Brooklyn, New York, will be continued during the academic year 1946-47. The course met with considerable success the year which has just ended.

The course includes the study of the processes and methods used in the production of pulp and paper, as well as equipment surveys and calculations, and all types of paper products are scrutinized. Enrollment is open to all qualified members of the industry, and will consist of thirty lectures.

The graduate study program in the pulp and paper field is under the direction of Robert S. Aries, consulting engineer and director of the Northeastern Wood Utilization Council. Assisting Mr. Aries will be a group of lecturers from among the prominent men in the paper industry, they include: R. G. MacDonald, of TAPPI; V. P. Edwardes, International Paper Company; Arthur Pollack, West Virginia Pulp & Paper Company; T. Malcolmson, Robert Gair Company; C. E. Libby, The New York State College of Forestry; R. M. Cobb, the Lowe Paper Company; Allan Shenck, Riegel Paper Company, and others.

◆

INVITATION CONFERENCE ANNOUNCED BY N.E. WOOD UTILIZATION COUNCIL

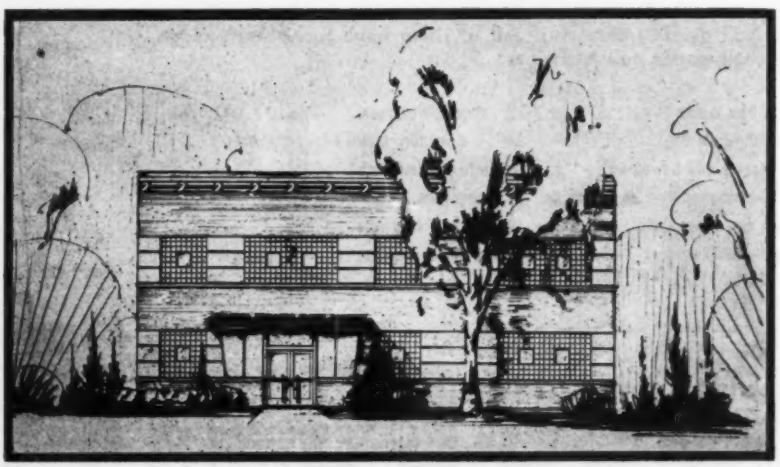
An invitation conference on new developments in hardwood pulp will be held at Syracuse, New York October 2, 1946, by the Northeastern Wood Utilization Council. The conference, held in co-operation with The New York State College of Forestry, is planned as a discussion group, which limits the number of participants. The papers presented will treat important pulping subjects and the meeting will carry special emphasis on the pulp mills in New England and New York. The Hotel Onondaga, Syracuse, New York, has set aside a block of rooms. Reservations should be made as early as possible. In writing, it will be necessary to mention the conference.

◆

FORESTRY STUDENTS TOUR INDUS. FORESTRY PLANTS IN STATE OF GEORGIA

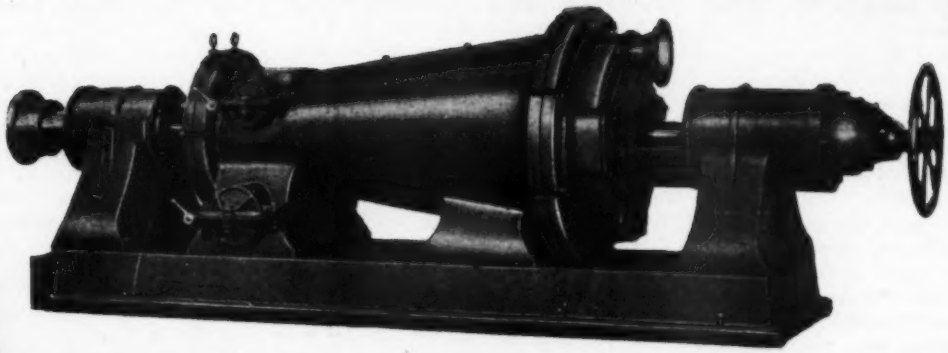
Thirteen seniors of the George Peabody School of Forestry, University of Georgia, toured the forestry industrial plants in Georgia during the month of July. The tour was directed by Professor G. B. Bishop, member of the Forestry School staff. The trip is made each year by students of the school to satisfy requirements for a bachelor's degree.

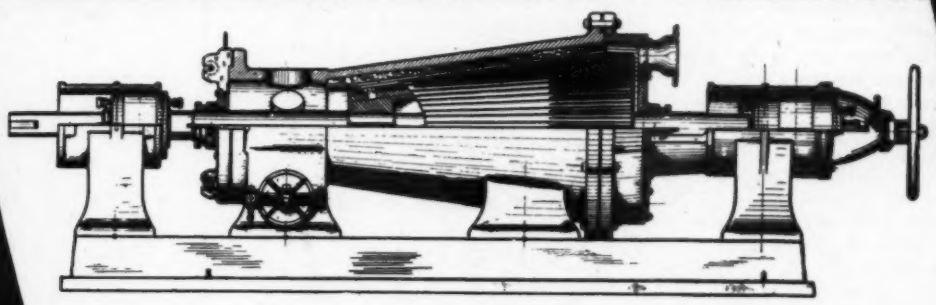
At Brunswick, the future foresters visited the Brunswick Pulp and Paper Company, Hercules Powder Company's plant, and the Georgia Creosoting plant; at Waycross, they observed the proper land use methods in effect at the Coastal Flatwoods Land Use Area; at Valdosta, they studied the Langdale naval stores plant. The Superior Pine Products Corporation holdings were visited to study correct management techniques.



Proposed new Nepco mill offices

THE JONES JORDAN





The modern Jones Jordan embodies highly engineered improvements that provide extreme accuracy of vital parts, thrust mechanism, and also carefully applied filling design to meet specific mill requirements. The proper application of filling permits either effective cutting action, or positive, efficient DEFIBERING, FIBRILLATING, OR HYDRATING, as desired.

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Fatigue Contributes to Inefficiency

▶▶▶ ALMOST EVERY MAN reaches a point in his work day when his efficiency begins to lag. He acts and reacts more slowly, his movements become heavier, his interest wanes, and he begins to make mistakes. This is the familiar phenomenon of fatigue. It is sometimes caused by physical exhaustion. But mental fatigue, showing up in physical tiredness, is probably more common.

Who does not know the unpleasant sensation of laming sleepiness creeping up? It then seems hardly possible to stay on the job until the whistle blows. That happens occasionally to all of us. But it happens most often to those whose work is monotonous routine. When a man's work keeps up his interest, he can easily work until he is exhausted. Unfortunately, there are not too many operations that will hold a man's attention for many hours. Hence, wherever the work is such that it gives rise to boredom, it is the supervisor's duty to become a fatigue fighter. He has to think about ways and means of keeping his men alert and interested. That is not a simple chore, particularly because no supervisor can do more than lies within his authority. But some of the following hints might be helpful in your own bailiwick.

Tests have revealed that in day-shift operations tiredness and fatigue are at a peak between ten and eleven in the morning and three and four in the afternoon. Prompted by these findings, many companies have introduced ten-minute rest periods during the high-fatigue and low-production hours. This break-up keeps the worker from becoming "fed-up" with what he is doing.

Change in what a man is doing also combats fatigue. When a man leaves his machine—to exchange a few words with someone else, to go to the rest room, to stretch, and so on—he provides himself with a needed interruption. This has led to a more systematic development in some companies. They have adopted plans which provide for operators to be assigned to different jobs or machines in the course of the day. Such work changes are not always practical, but the principle is nevertheless sound.

If a change cannot be made in what a man is doing, it may still be possible to allow for a change in how he is doing it. For instance, it may help the operator a great deal if he can change his position at will from sitting to standing.

Poor working conditions are just what the doctor ordered—if you want bleary-eyed operators. Where heating, lighting, and ventilation are deficient, the fatigue curve is pushed up even if the work itself is stimulating. When a worker is chilled or roasted, when he has to strain his eyes, when he finds normal breathing difficult, the energy consumed in overcoming these handicaps naturally reduces the energy he can give to his work.

Work practices and habits can be fatigue breeders, too. Inefficient work layouts make for unnecessary movements. Also, men must be shown how to work without tiring themselves out needlessly. The fellow who is doing his job in an inconvenient manner will become just as tired as the one working under poor conditions and just as soon.

The alert supervisor will school himself to recognize these factors. He will fight fatigue to boost production. (*The Foreman's Letter*, August 14, 1946).

◆

PUGET SOUND PULP & TIMBER OWNERS OF NEW BELLINGHAM PAPER PRODUCTS COMPANY

Seventy-five per cent ownership in the newly formed Bellingham Paper Products Company has been assumed by the Puget Sound Pulp & Timber Company, Bellingham, Washington.

The Bellingham company, a $460,000 project, will operate a mill on land leased from the parent company. Operation of the mill will require an estimated 12 per cent of the pulp output of Puget. At capacity operation the Bellingham plant is expected to produce 45 tons of paperboard a day which will be used in packaging food products and other items.

◆

ADHERENCE TO FORESTRY PRINCIPLES NEEDED TO MEET WOOD CONSUMPTION

The shortage of lumber is due to the tremendous consumption of wood in this country. According to The New York State College of Forestry at Syracuse, University, the United States uses more than half the lumber, more than half the paper, and two-fifths of all forms of wood consumed in the world. Yet this country has only 9.1 per cent of the world's forest area, while Russia has 21.1 per cent; the British Commonwealth of Nations has 21 per cent; Brazil has 13.4 per cent; and the balance is divided among fifty other nations.

Estimates indicate that since 1800, sufficient lumber has been taken from our forests to build 191 million wood houses, six times as many as the United States now has; and in that same period the country consumed a larger amount of fuel.

The total amount of wood cut from the forests of the United States is between 60 and 70 billion board feet. This includes lumber, pulpwood, plywood, fuelwood, and railroad ties. This tremendous consumption does not include timber lost due to insects, disease, and fire. The application of sound forestry principles in the United States is one of the most important problems of the government and of industry.

◆

▶▶▶ CREATION OF A NEW Packaging Machinery Department headed by R. E. Read, has been announced by the Union Bag and Paper Corporation, New York City. The department will help in the solution of customers' packaging problems, including the designing of new equipment in cases where machinery does not exist.

R. E. Read

◆

▶▶▶ ACQUISITION OF THE Weaver-Wall Company, Cleveland, Ohio, by the Celotex Corporation which will include the operation of the asphalt shingle roofing and siding plant, and the Avery, Ohio, felt plant has been announced.

◆

▶▶▶ INDUSTRIAL RELATIONS executives are to confer in an attempt to evaluate current trends in labor relations and personnel administration in the interest of increased labor-management co-operation at a meeting to be held in Boston, October 8 and 9, under the sponsorship of the Personnel Division of the American Management Association.

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NEW PULP SALES PLAN FOR ST. REGIS PAPER COMPANY

Announcement has been made by R. K. Ferguson, president of St. Regis Paper Company, New York City, that after this year a new sales plan for the company's pulp will be in effect.

Beginning January 1, 1947, the company's bleached and unbleached sulphate pulp will be sold exclusively by the St. Regis Sales Corporation, the St. Regis sales subsidiary. St. Regis pulp, produced at the company's Tacoma (Wash.) mill, formerly was sold by Bulkley, Dunton Pulp Company, Inc., New York City, as brokers.

R. L. Vayo, sales manager of the pulp division, has announced that William McNair, assistant pulp sales manager who is now on loan to the Office of Price Administration in Washington, will return soon to re-establish and manage the Chicago pulp sales office.

◆

FIRST KIMBERLY-CLARK FELLOWSHIP ESTABLISHED

The establishment for the first time of Kimberly-Clark fellowships was announced August 29 by the corporation, with grants offered to the University of Wisconsin, the University of Minnesota and the Massachusetts Institute of Technology by the technical department of the corporation.

It is expected that the Kimberly-Clark fellowships will be arranged in time for 1946-47 terms, to be coincident with the opening of the new Kimberly-Clark Research and Development Laboratories on which work has been in progress since last September. "The fellowships represent a policy-conception we have that Kimberly-Clark should spend more of its research budget in fundamental background work," H. A. Rothchild, technical director said, "and we expect to accomplish this in part through sponsorship of research fellowships. The field of study has been specified only to the extent that the subject shall be of interest and value to the pulp and paper industry."

The new Kimberly-Clark laboratories are reaching completion and will provide centralized facilities for 170 scientists and additional research and development personnel. Generally, it is expected to represent the most extensive commercial technical laboratory in the pulp and paper industry.

◆

▶▶▶ THE GOVERNMENT HAS reinstituted wood pulp subsidies on marginal production to offset losses expected under present regulations.

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A high grade Pump proven over a long period of time. Will efficiently handle:

CONCENTRATED BLACK LIQUOR
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BRIEFS

▶▶▶ THE FOURTEENTH annual meeting of the Packaging Machinery Manufacturers Institute will be held at the Shawnee Country Club, Shawnee-on-Delaware, Pennsylvania, September 29 to October 1. The Institute membership is comprised of fifty companies which build diversified types of packaging equipment.

◆

▶▶▶ CONTROLLING INTEREST in the century old paper manufacturing concern, Louis Dejonge & Company, New York City, has been purchased by the Louis Schulman Company, also of New York.

◆

▶▶▶ ACCORDING TO REPORTS received by the Office of International Trade, Department of Commerce, (Washington, D. C.), import licenses will be issued more liberally in India for a limited number of products in order to increase the supply of raw materials and to relieve consumer needs in that country. Among the items to be freely licensed are: writing paper, printing paper other than newsprint, unspecified paper excepting cigarette paper, wrapping and packing paper, and old newspaper in bags and bales.

◆

▶▶▶ THE PURCHASE OF 51,000 acres of pine timberland in Klickitat County, Washington, has been made by the Longview Fibre Company (Longview, Washington). The timberland was acquired from the Western Lumber Company, of Portland, Oregon.

◆

▶▶▶ INSTALLATION OF two new grinders at the Pacific Paperboard Company, Longview, Washington, began in August. The installation of the grinders, together with other equipment, makes possible the doubling of the company's pulp producing activities. The need for ground wood is increasing due to the decline in waste paper collections following the close of the war.

◆

▶▶▶ MEMBERS OF THE Quarter Century Club of the Marathon Corporation, Menasha, Wisconsin, received gold watches from the company in recognition of their faithful service. One hundred and thirty members of

STEPLESS Speed Changes

. . . from A-c. circuits!

RELIANCE V★S DRIVE

V★S, the *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* brings to any production or processing operation an unlimited selection of *stepless* speed changes. Acceleration and deceleration are unbelievably smooth. And every V★S function can be performed automatically or manually, with all-electric control from nearby or remote stations!

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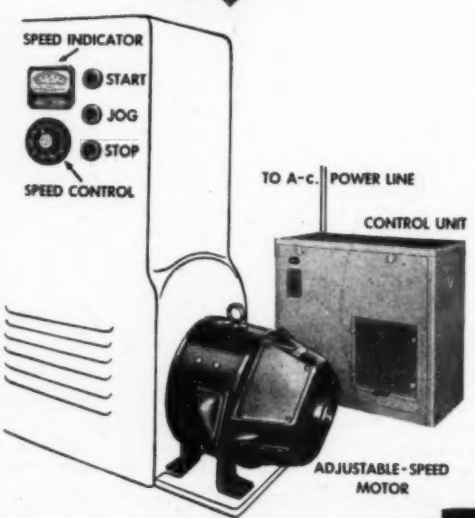

Conveniently-packaged, space-saving V★S Drives available in Rotating or Electronic Systems or a combination of both.

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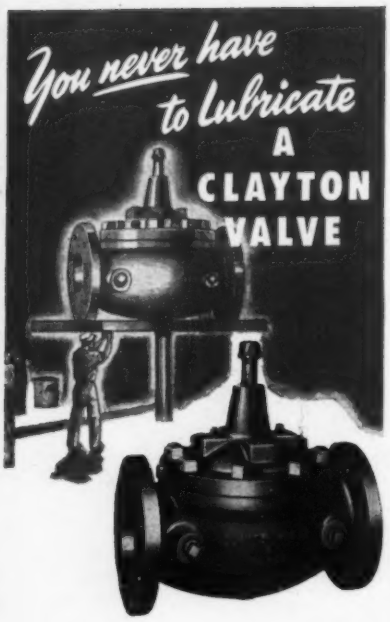
"Motor-Drive is More Than Power"



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CLAYTON VALVES
with FEATHER-TOUCH CONTROL

the club were presented timepieces. The presentation was held up by the war while there was a scarcity of watches. The Quarter Century Club is an organization within the Marathon Corporation at the Ashland, Rothschild, Wausau, and Menasha mills.

◆

▶▶▶ A PLAN HAS BEEN PERFECTED by the Great Northern Paper Company of North Anson, Maine. Pulpwood is trucked to the high bank of the Carrabassett River, and water is pumped from the river to force the piled wood into the conveyor, then down to the river. The pulpwood is thus floated into the Kennebec River to the mills at Madison. In this way, the labor of many men is saved.

◆

▶▶▶ IN ORDER TO consolidate all departments and customer services of United Wallpaper, Incorporated, additional space has been leased by the company in the Merchandise Mart, Chicago.

◆

▶▶▶ ANNOUNCEMENT HAS been made by the Office of Alien Property Custodian Washington, District of Columbia, that the recent accord reach in London concerning German owned patents extends the policy of licensing former German owned patents to citizens of other countries signing the accord on a non-exclusive, royalty-free basis.

◆

▶▶▶ EXCLUSIVE BUYING agents in North America for the Australian Paper Manufacturers, Limited (Melbourne and Sydney, Australia) will be Price & Pierce, Limited, 60 East 42nd Street, New York City. The Canadian office of Price & Pierce is 1058 Sun Life building, Montreal.

◆

▶▶▶ THE FORMER GOVERNOR of South Carolina, and now Senator from that state, Olin D. Johnston, in a message to the United States Senate July 29, rendered high praise to the manufacturers of paper cups and containers for their work during the war which prevented the spread of epidemics.

◆

▶▶▶ OFFICERS OF THE Kimberly-Clark Corporation's Foremen's Club, Kimberly, Wisconsin, who will take over their duties this fall, are: Clarence Bouressa, president; William McDonald, vice president; Jack Clark, secretary; Oscar Forbeck, treasurer; and Carl Krenkel, Angus McIntyre, Mac True, Theodore E. Lamers, and Albert Briggs, directors.

▶▶▶ A NEW PLANT will be erected at Fort Smith, Arkansas, by the Dixie Cup Company for the manufacture of food containers and two types of paper cups. The cost of the building will be $500,000, and it is expected to require a staff of 350 employees. The production of the new plant will be distributed in Arkansas, Louisiana, Texas, Missouri, west Mississippi, west Tennessee, and eastern Kansas.

◆

▶▶▶ A NEW GLASSINE and greaseproof paper machine has been ordered by the Riegel Paper Corporation, New York City, for installation in its Milford, New Jersey, mill. The Civilian Production Administration has authorized the necessary plant construction for housing the new unit, and production is expected to begin within fifteen months.

◆

▶▶▶ A BRANCH OFFICE has been opened at 202 Farr Building, Allentown, Pennsylvania, by St. Regis Sales Corporation, sales subsidiary of the St. Regis Paper Company, New York City. This office, the company's 21st sales office in the United States, was opened to handle an increased volume of business in its multiwall paper bag division. All of the major cement plants of the great Lehigh Valley are located nearby. The new office is under the supervision of J. Lea Fearing, Jr.

◆

▶▶▶ IN A SPEECH to the American Standards Association at its award dinner honoring 1300 volunteers who served on industrial standards projects during the war, Brigadier General Donald Armstrong, former commandant of the Industrial College of the Armed Forces, told his audience that the best assurance of a continued peace was the maintenance of American industrial leadership. General Armstrong delivered his speech at the Officers' Club of the Brooklyn Navy Yard, August 14.

◆

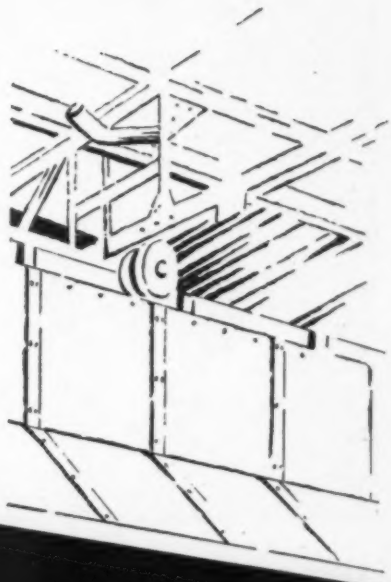
▶▶▶ PURCHASE OF THE fixed assets of the Franklin Board and Paper Company, Franklin, Ohio, has been made by the Stone Container Corporation of Chicago. The Franklin plant and the Coshocton Straw Paper Company of Coshocton, Ohio, will be operated as divisions of the Stone company.

◆

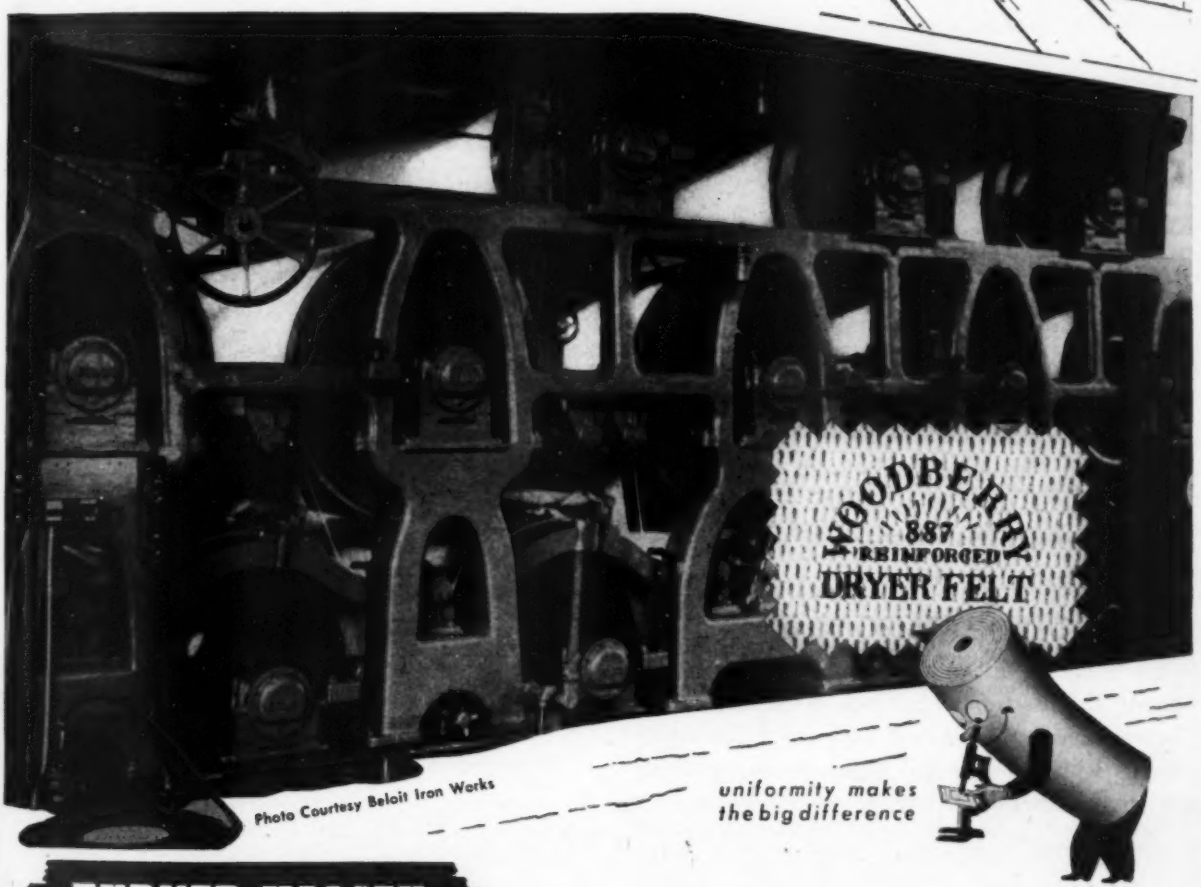
▶▶▶ A FLASH FIRE RACED through 8,900 tons of paper at the Hummel & Downing Box Company, Milwaukee, Wisconsin, August 20. The fire destroyed fourteen stacks of paper valued at $200,000.

Maximum Wear at Minimum Cost

Longer wearing contact surfaces, minimum amounts of shrinkage and stretch, and a higher degree of porosity, which results in lower steam consumption, are features that have made WOODBERRY 887 all-cotton dryer felts the prime choice of the paper industry.



For felts that will give maximum wear with minimum costs, specify WOODBERRY 887 all-cotton, heavy duty dryer felts.



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Sandy Hill Multi-Cylinder BOARD MACHINE

VERSATILITY OF DESIGN

The artist's sketch visualizes a board machine designed to serve as a basis for discussion in the light of the particular requirements of the papermaker. This machine would operate in the neighborhood of 500 ft. per minute. The layout could be varied to provide for making boards ranging from test liner to bristols at speeds and widths to suit your purpose.

Consultation between the men who build it and the men who use it, assures a multi-cylinder board machine that fits your requirements perfectly. It may be built, for example, with more or fewer vats, a mill-determined number of presses, stacks or calenders.

TIME-PROVEN COMPONENTS

This machine, in its basic design, incorporates Sandy Hill Bertrams open side calenders, an improved constant speed reel, high speed unwinding stands with water cooled brake drums, selective drive and other features.

SANDY HILL INGENUITY

Elimination of reverse bends in felts, arrangements for quick felt change and exceptionally sturdy press and dryer frame construction are examples of Sandy Hill engineering "know-how".

Standard features include anti-friction bearings throughout, suction press rolls and suction drum rolls, sixty or seventy-two inch diameter dryers, automatic felt guides, dryer doctors, oscillating press doctors, Scofield felt cleaners, suction boxes and showers.

INCREASED PRODUCTION EFFICIENCY

Efficiency is increased and production and maintenance costs reduced through the use of steam joints of modern design, continuous automatic lubrication of dryer and dryer felt bearings, adequate condensate evacuation system and vapor evacuation system with hood.

Write for New Bulletin

THE SANDY HILL IRON & BRASS WORKS
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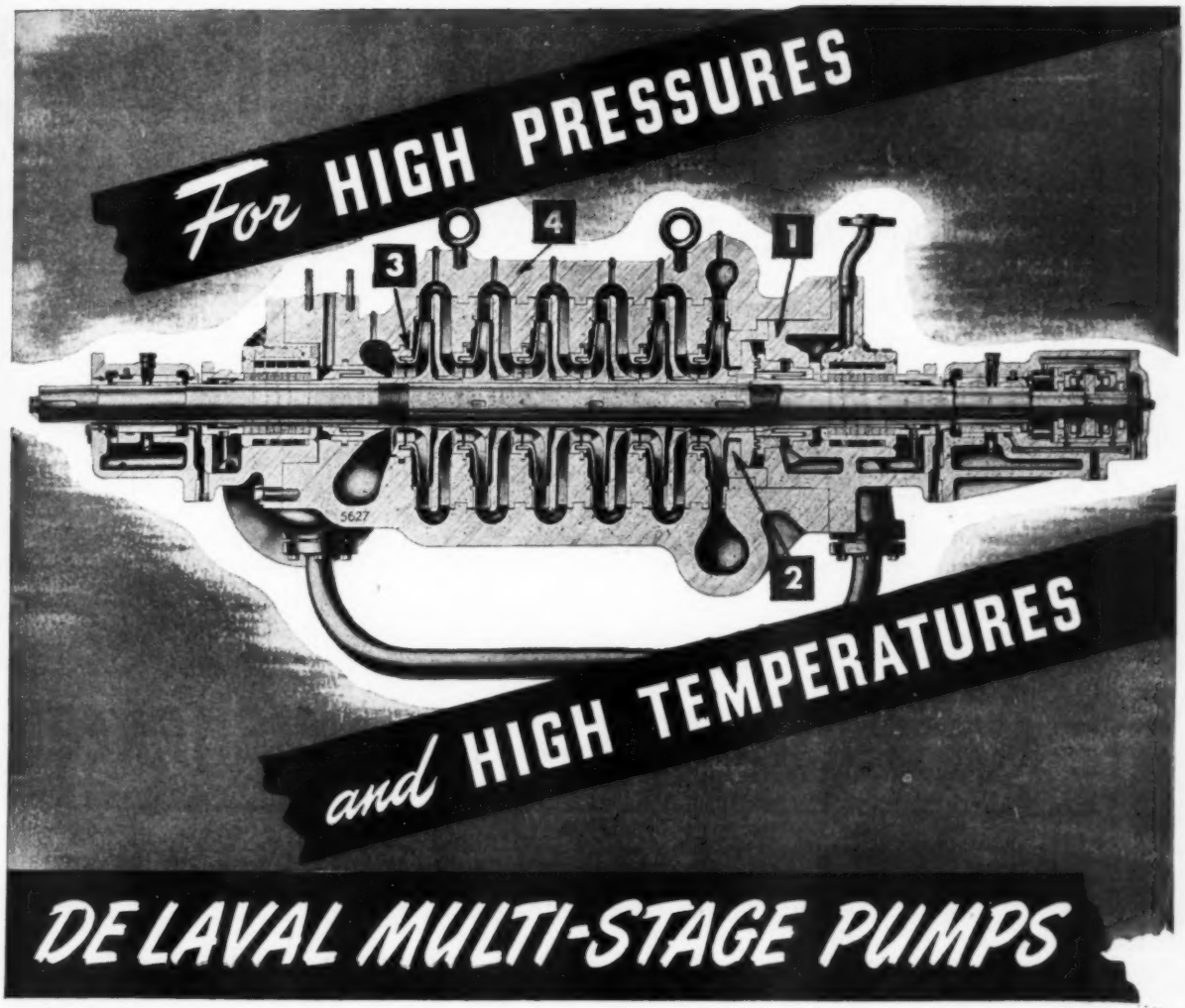

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"Pulp Quality Raised",

"OUR STREAMBARKER IS AVERAGING 9½ CORDS PER HOUR" BELOW, COMPARE RESULTS AT 11 OTHER MILLS!

MILLS MAKING HIGH-GRADE PAPER are quick to appraise the value of any new equipment which can maintain a cleaner woodroom operation and thus lead to higher pulp quality.

This cleanliness of process, along with other important savings in wood, extra operations and machines, is the primary purpose of the modern Allis-Chalmers Streambarker hydraulic log barker.

Pictured here in operation at one of the nation's leading mills producing high-grade book and magazine papers, Streambarker is barking an average of 9½ cords of Spruce, Hemlock, etc. an hour. Logs are taken from a hot pond, are barked and conveyed directly to chippers or to storage—with minimum recirculation. The standard of performance established at this mill has led to the recent installation of an additional Streambarker in another of the company's mills.

For a complete explanation of Streambarker operation, plus a handy form which enables you to accurately estimate savings Streambarker can effect in your mill, get in touch with the experienced representative in your nearby A-C office, or write direct for "Streambarker Economics" bulletin B6391. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 2043

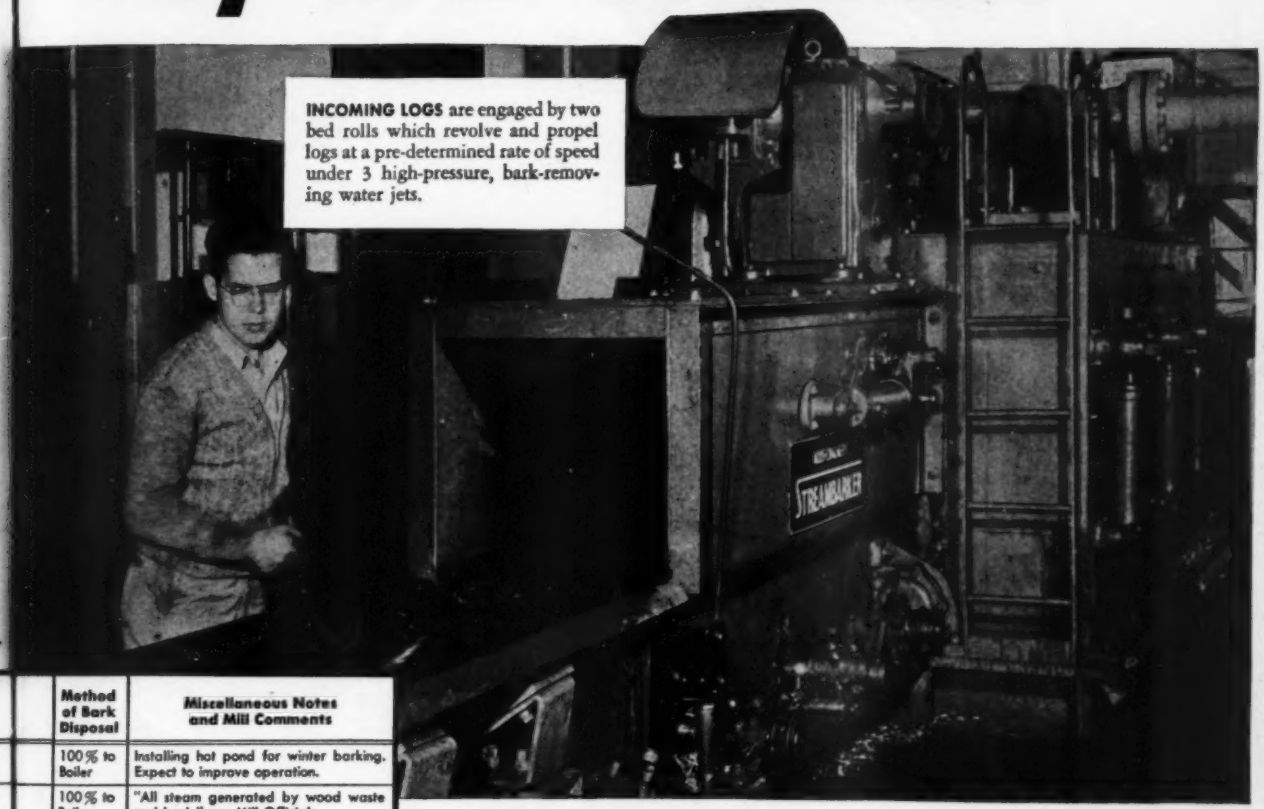
12 MILLS REPORT ON STREAMBARKER

MILLS	Species of Wood Barked	Size of Logs Barked	Streambarker Schedule		Water Pressure		No. of Men, Convey., Barker, Inspec.	Capacity		Process in which Streambarked Wood is Used
			Hours per Day	Days per Week	Summer	Winter		Summer	Winter	
MILL A	Spruce, Fir and Hemlock	4 to 18" diam., 4 ft. long	16 to 24	6 to 6½	750 lbs.	750 lbs.	4	9	6	50% Sulphite 50% Groundwood
MILL B	Spruce, Fir and Poplar	4 to 18" diam., 4 ft. long	9	6	670 lbs.	670 lbs.	3	10	8	100% Groundwood
MILL C	Spruce and Hardwood	4 to 20" diam., 4 ft. long	24—auxiliary to drums	6 to 6½	650 lbs.	650 lbs.	4			Bleached Sulphite
MILL D	Spruce	4 to 18" diam., 4 ft. long	9 to 12	6	730 lbs.	730 lbs.	4	13	8½	88% Sulphite 12% Groundwood
MILL E	Balsam, Hemlock, Spruce, etc.	4 to 20" diam., 4 ft. long	16	6	670 lbs.	770 lbs.	3 to 4	9½		60% Sulphite 40% Groundwood
MILL F	Spruce and Fir	3 to 18" diam., 4 ft. long	Auxiliary to drums	6	750 lbs.	750 lbs.	3			Groundwood, Unbleached Sulphite
MILL G	Spruce and Fir	3 to 18" diam., 4 ft. long	24	6½	780 lbs.	780 lbs.	4	9	7	100% Sulphite
MILL H	Birch, Maple, Beech	4 to 18" diam., 4 ft. long	17	6½	635 lbs.	635 lbs.	7 incl. unload, loading	9	7½	100% Soda
MILL I	Poplar and Spruce	4 to 20" diam., 4 ft. long	16	6½	750 lbs.	750 lbs.	4	10	7	100% Sulphite
MILL J	Spruce, Fir, Pine, Hemlock	4 to 20" diam., 4 ft. long	24	7	650 lbs.	750 lbs.	3	9½	6½	50% Sulphite 50% Groundwood
MILL K	Pine, Birch, Poplar, etc.	3 to 20" diam., 4 ft. long	8	6	675 lbs.	675 lbs.	5	10	6½	100% Soda
MILL L	Spruce	3 to 20" diam., 8 ft. long	16	6	675 lbs.	675 lbs.	4	10	9½	50% Sulphite 50% Groundwood

ALLIS A-C CHALMERS

One of the Big 3 in Electric Power Equipment—
Biggest of All in Range of Industrial Products

say Mill Officials!



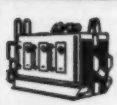
INCOMING LOGS are engaged by two bed rolls which revolve and propel logs at a pre-determined rate of speed under 3 high-pressure, bark-removing water jets.

	Method of Bark Disposal	Miscellaneous Notes and Mill Comments
	100% to Boiler	Installing hot pond for winter barking. Expect to improve operation.
	100% to Boiler	"All steam generated by wood waste and bark," say Mill Officials.
	Bark to Dump	Streambarker used on wood which other barking equipment cannot handle.
	100% to Boiler	"Pulp quality raised materially," say Mill Officials.
	Bark to Incinerator	Booster pump for winter barking has recently been installed.
	100% to Boiler	Streambarker barks wood which other barkers cannot efficiently handle.
	100% to Boiler	Streambarker is first full-scale barker this mill has installed.
	Bark to Dump	One of 1st-Streambarker installations—yet low maintenance right along.
	100% to Boiler	"We've eliminated knot boring, hand-cleaning, etc.," state Officials.
	⅔ to Boiler, ⅓ to Dump	Streambarker cleans logs that cannot be cleaned by other barkers.
	100% to Incinerator	"Barker operation and capacity both very good," say Mill Officials.
	100% to Boiler	Booster pump being installed to raise pressure to 775 pounds.

NEW MOVIE RELEASE!

FREE 16 MM PRINTS now available of new color-sound movie, "The Case of the Barking Logs". Filmed during sub-zero weather, it shows entire Streambarker operation, inside and out; explains clearly its principles of operation.

With film you will receive copies of illustrated 8-page booklet reviewing the movie. Film runs 9 minutes on 16 mm sound projectors. Copies available through A-C advertising Dept. Be sure to state approximate number of people expected to see movie. NOTE: This film offer good only in continental U. S. A. ALLIS-CHALMERS, MILWAUKEE.



PREPARATION—Hydraulic Barkers, Chip Screens, Saws, Slashers, Grinders.

COOKING—Digesters, Blow Tanks, Kilns, Heat Exchangers, Condensers.

WET ROOM—Vibrating Screens for use as Thickeners, dewatering rejects, etc.

PAPER-MAKING—special drives for Paper Machines, Rewinders, Calenders.

POWER—all types of Power Generation, Distribution and Control.

MOTORS and control—all types a-c and d-c, 1 to 7000 hp—Gearmotors.

TEXROPE V-belt drives—fractional to 5000 hp—constant and adjustable.

PUMPS—Single and Multi-Stage, 10 to 150,000 gpm—Paper Stock Pumps.

Perhaps you know ROSS AIR SYSTEMS as individual units. Actually a combination of units is used to meet your individual mill requirements; to make one integral and complete AIR SYSTEM for your particular manufacturing process.

J. O. ROSS ENGINEERING CORPORATION prides itself in being one organization that can properly take care of all your air needs. Each problem is carefully analyzed with the overall picture in mind.

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J. O. ROSS ENGINEERING CORP.

DESIGNERS AND BUILDERS OF AIR PROCESSING SYSTEMS

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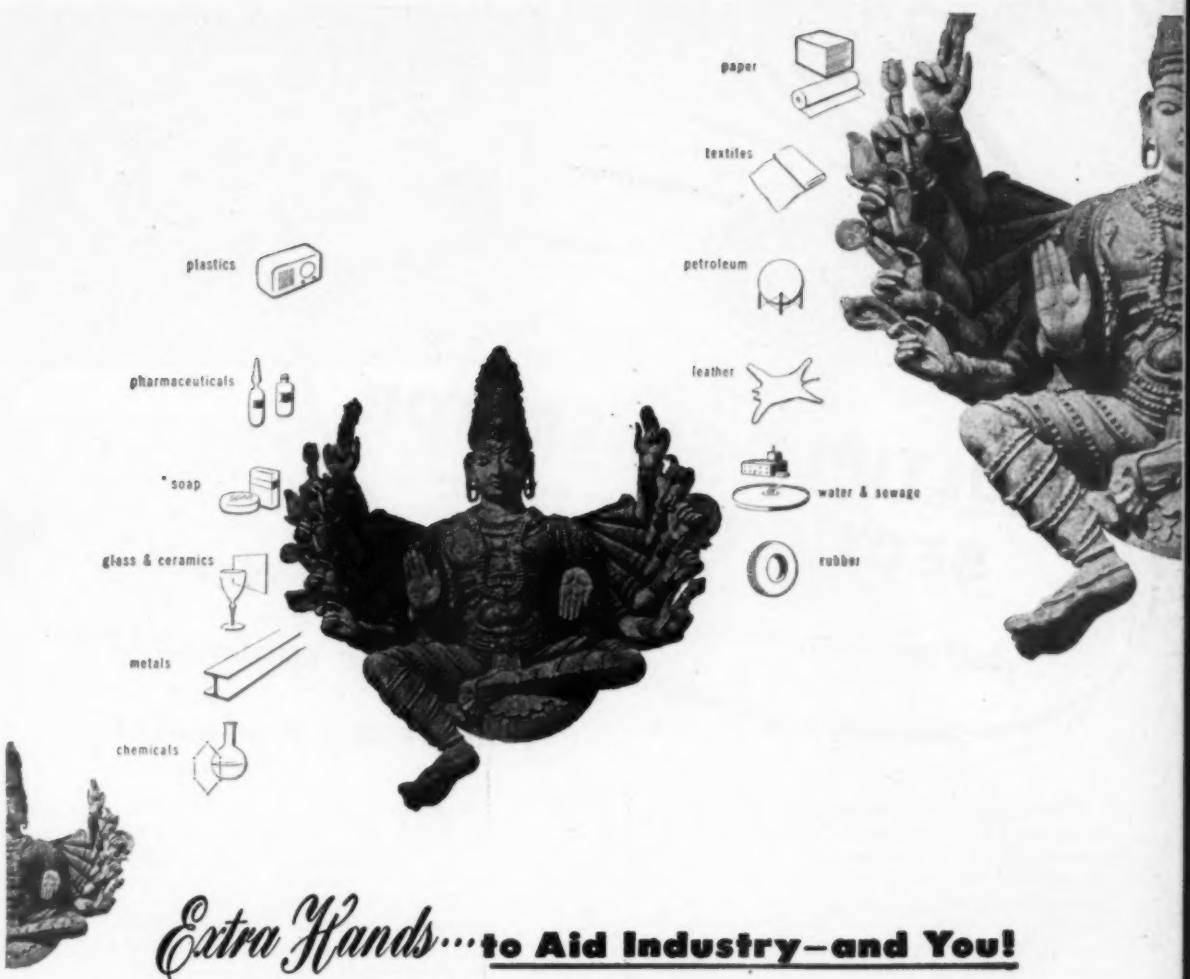


Extra Hands... to Aid Industry—and You!

HANDLING COMPLEX PROBLEMS in the chemical process industries makes many a purchasing and production executive wish he had as many extra hands as this ancient Hindu idol to help him through—*and he has!*

THEY ARE HIS... and yours—in the cooperation and assistance of chemists, engineers, and technicians on General Chemical Company's Technical and Engineering Service staffs. These experts are well qualified by technical training and by practical industry-wide experience to offer sound, constructive advice in many ways—whether your problems deal with industrial, scientific or agricultural chemicals.

THEY CAN FURNISH pertinent data on properties, grades, and packaging of General Chemical products . . . advise on materials and methods for handling and storing them . . . consult on their applications to your operations,.. and work with you in the development of special chemicals to meet your individual requirements.

When "extra hands" such as these can help you, just phone or write to the nearest General Chemical Company Sales and Technical Service Office listed below.

GENERAL CHEMICAL COMPANY

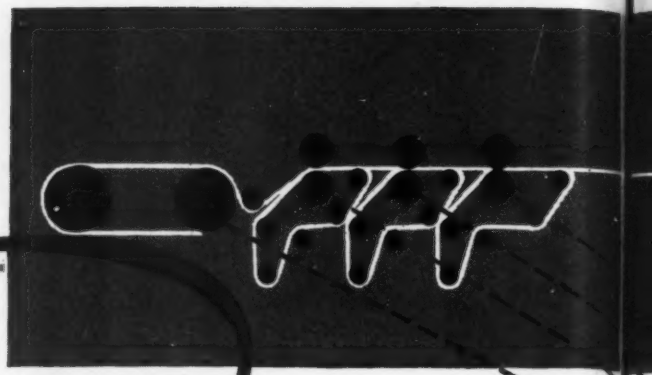
40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Albany • Atlanta • Baltimore • Birmingham Boston • Bridgeport • Buffalo • Charlotte • Chicago • Cleveland • Denver Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Providence • San Francisco • Seattle • St. Louis Wenatchee (Wash.) • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited
Montreal • Toronto • Vancouver

New



MULTIPLE-GENERATOR SECTIONAL DRIVE

...helps you maintain higher running speeds,

...reduce spoilage losses,

...increase production

Here's the newest development in sectional paper-machine drives, designed by G.E. to help you boost output and reduce costs. It's a multiple-generator sectional drive and it's *simple to install, simple to operate,* and *simple to maintain.* Thanks to more than five years of war-accelerated development in the design and application of electronics and amplidynes, G.E. now brings you smooth, constant paper speed and tension control at less cost. Your machines can operate at higher running speeds—you can reduce spoilage losses—you can increase your output.

Easy to install

The controls for each section of a G-E multiple-generator drive system are separately "packaged" in modern panels and completely assembled in our factory. They require no extensive adjustments or checking of interlocking circuits.

Power and control wiring is much simpler than that used in older drives because no intricate controls are needed for interlocking relays with other section-control panels.

Easy to operate

You can start several section drives simultaneously, each drive coming up to a preset speed quickly and smoothly. Load or draw changes in any one section do not disturb adjustments in other sections.

Draw adjustments for any single section are easily obtained by means of a small rheostat. Slack take-up is easily accomplished without affecting draw adjustments. Response to speed and load changes is so fast that over-correction, unavoidable with slower mechanical regulators, is eliminated.

Easy to maintain

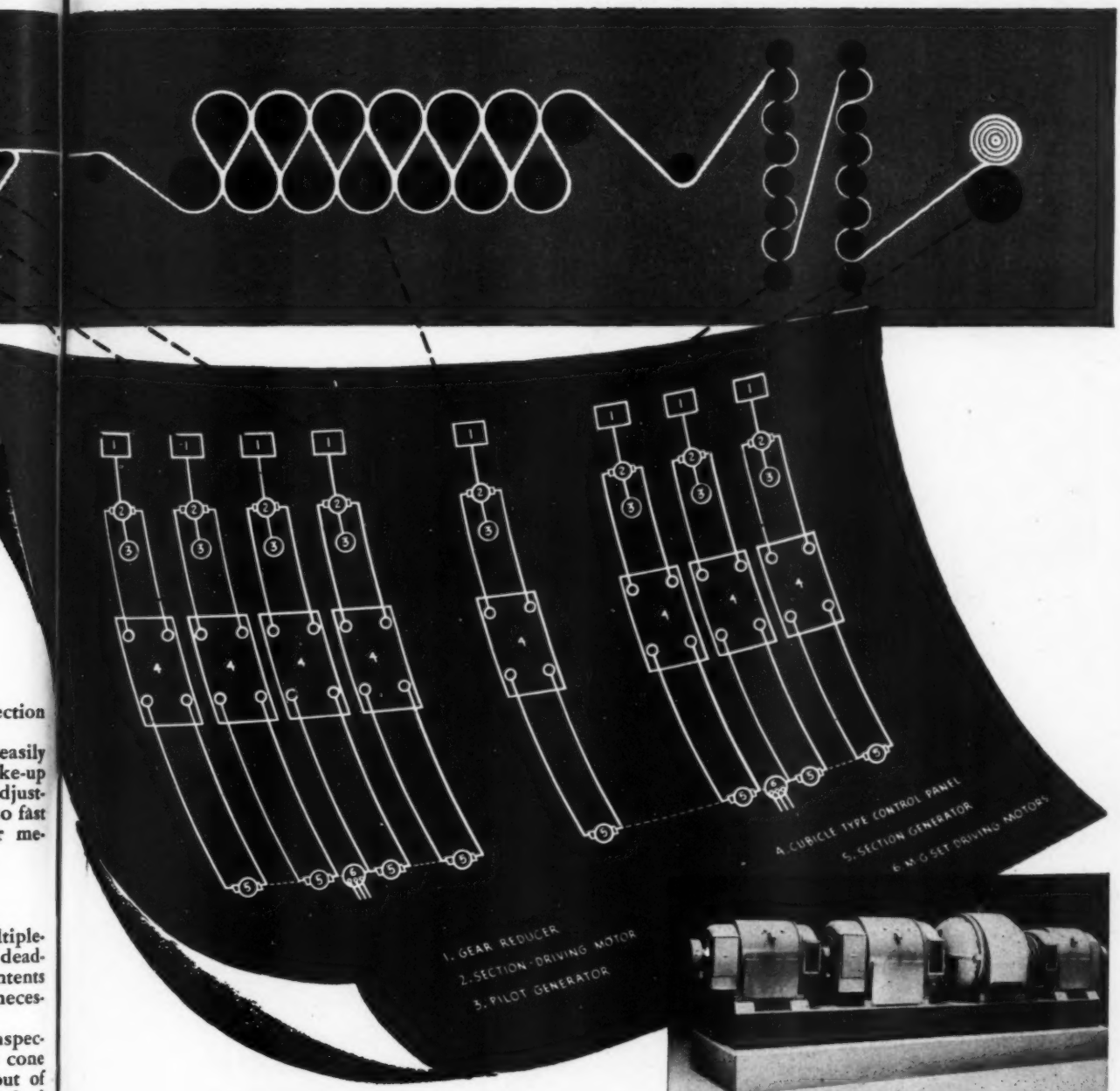
All wiring and control devices in a G-E multiple-generator drive are incorporated in simple, dead-front cubicles, all of which have identical contents and arrangements except for minor differences necessitated by varying ampere ratings.

The electronic speed regulator requires little inspection and maintenance for there are no gears, cone pulleys, or other mechanical devices to get out of order. Replacements are limited largely to standard inexpensive electronic tubes.

"Down time" for wash-up, inspection and maintenance of the paper machine itself is greatly reduced because each section drive can be jogged or operated at slow speed simultaneously with or independently of other sections.

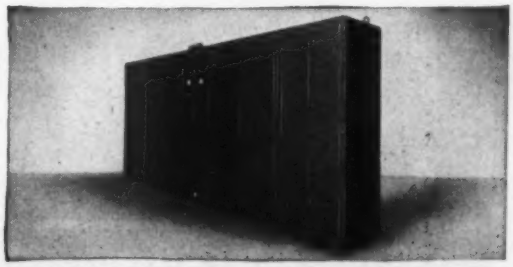
First to build a multiple-generator sectional drive for paper machines, G.E. continues to pioneer in the design and engineering of efficient, low-cost paper-mill drives. Other improved drives have already been developed for chippers, grinders, stock-preparation machines, super-calenders, and winders. Why not consult your nearest G-E sales engineer now while your plans are still in the formative stage? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

PAPER MILL Drives



G-E MULTIPLE-UNIT MOTOR-GENERATOR SETS *are sturdy, give long, reliable service and require no more than routine maintenance check-up.*

In a G-E multiple-generator sectional drive, the drive for each section is, in effect, a complete and independent system. Each section motor is powered by its own adjustable-voltage generator whose output voltage is varied to give precise control of the speed of each section. There is no connection between individual section controls except for a stable reference voltage feeding the electronic-pre-amplifier in each control panel. The multiple-generator system permits an adjustable-voltage drive to perform to its best advantage by operating only on generator voltage control without change in motor-field excitation, thereby giving full motor-torque efficiency under all operating conditions.



THE MULTIPLE-GENERATOR CONTROL PANELS *are steel enclosed in dead-front cubicles that protect personnel and equipment, yet are easy to inspect. They can be installed individually or in groups.*

GENERAL ELECTRIC

660-34-157

KELGIN, the superior surface sizing agent, spells "unequalled results" in the preparation of paperboard for gloss ink printing. It fully controls penetration of printing ink oils and waxes . . . produces a smooth, dense surface . . . provides brilliant colors and a high gloss.

KELGIN is ideal for water box application in the calender stacks. It is economical—simple to apply. Kelgin will not cause picking, foaming, sticking to the rolls. It is readily soluble in hot or cold water.

KELGIN is a product of Nature—free of impurities—and processed to produce consistently uniform results. Consult our Technical Department about your commercial application with KELGIN—naturally there is no cost or obligation. Just drop us a line today.

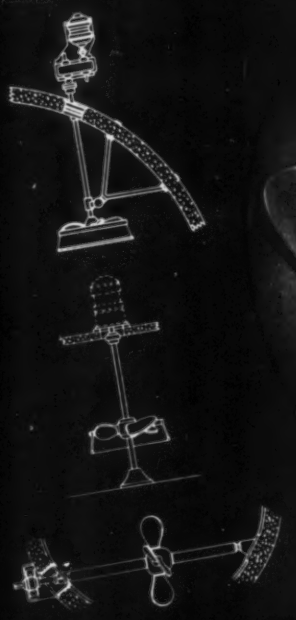
KELCO COMPANY

20 N. Wacker Drive, CHICAGO-6 | 31 Nassau Street, NEW YORK-5 | 530 W. Sixth Street, LOS ANGELES-14

Cable Address: KELCOALGIN—New York

IMPCO *Agitators*

for every mill application



PUMPABLE STOCK in horizontal mid-feather type chests can be agitated efficiently and economically with one or more of our channel type, adjustable pitch propeller units.

The propellers can be field-set for any proportion of motor load needed for good agitation; any commercial drive ratios can be used within 10% of preferred propeller speed; propellers can be reset for radically changed operating conditions.

Eight sizes: 24" to 72". Materials: cast iron, bronze, stainless or rubber covered.

For other horizontal and vertical chests there are many possible combinations of agitator elements and drives: open, shrouded and weedless propellers; sweeps and screws; solid and tubular shafts; in single and multiple assemblies.

Write us an outline of your problem. We will submit a proposal for study.

Improved **PAPER MACHINERY CORPORATION**

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FOR SLIME CONTROL

In a one-ounce sealed envelope. Throw it in the beater unopened

Cleans Pipes
Kills Bacteria
Reduces Washups
Fewer Slime Rejects

R. T. VANDERBILT CO., INC.
230 Park Avenue, New York City

The Paper Industry Has Problems

▶▶▶ WITH THE RELEASE of the Federal Reserve Bank and Government reports on business for the month of July and also for the first six months of 1946, it is seen that we are in a period of economic expansion, such as we have never before envisaged.

Yet, large as it is, greater volumes of production and consumption are surely ahead of us. For despite the gain in production, it is all going into ready consumption and the volume falls far short of satisfying the consumptive demand in this country alone. The rest of the world is but biding its time until it may enter our markets for the huge volume of commodities which it is needing.

It is in error to limit our volume ceiling to the prewar production and consumption basis, for there has been an increase in population of over ten million more consumers than we had in 1940. Moreover, the increase of domestic consumers is continuing at a rate two times greater in the 1940-1950 decade than in the 1930-1940 decade, and, in addition, these consumers have the money to buy the goods.

National employment in July was 58,100,000 not including those in the armed forces. National income is running at the rate of more than $160,000,000,000 per year—double the income of 1929.

The nation is plowing ahead on its inevitable comeback to constructive prosperity in spite of the hampering red tapes and bureaucratic hamstringing of its false prophets in exactly the same way as it surmounted all these self-same obstructions with which they endeavored to hamstring America's efforts to win the war.

It was the combination of men, machinery, materials and money plus the "know-how" that enabled America to aid in winning the war. This same combination of factors is again engaged in the determination to win the peace, and nothing will be allowed to snatch that victory from us.

Economic movements are like the tides. The difference between high and low tide, is time. The low tide has been reached and passed. We are now witnessing the turn. The tide is moving in and up so inevitably and irrevocably that all the efforts to sweep it back by all the crackpots of Christendom will be of no avail.

Now, this tidal comeback is presenting new problems to all industry. But, the paper industry is confronted with a grave problem which baffles solution. That problem is raw material shortage.

Pulp and paper products are the concomitants of all industrial activity. They are the prerequisites of industrial and commercial expansion.

We must have an abundance of paper upon which to chart our prospectuses and provide the resultant activity with tonnage to maintain and sustain it.

"During the first six months of 1946, fifty-one per cent of this country's new supply of market wood pulp was imported."

The United States produced 49 per cent; Canada supplied 31 per cent; Sweden sent us 17 per cent; Finland shipped us 3 per cent.

For the last six months of this year, the Industry Report on Pulp & Paper prepared by the Office of Domestic Commerce, Forest Products Section, says: "Swedish wood pulp exporters have canceled approximately 50 per cent of tonnage contracts for the second and third quarters, according to a survey conducted by the Association of Pulp Consumers of 152 United States paper mills using purchased pulp. These mills also report inability to renew or place contracts for the fourth quarter."

If they cannot get pulp, these mills cannot make paper. So, it is a foregone conclusion that the production of paper products for the current year will probably not exceed the total of 1945—viz. 17,375,000 tons.

In 1945, paper production was 87 per cent and the board division ran 93 per cent of capacity respectively. We had capacity to produce more, but lacked raw material supplies principally.

Again, quoting from this same July, 1946, report, under the caption of "The Paper and Paper Board Shortage": "An indicated paper and paperboard shortage on an annual basis of around 4,000,000 tons below consumption requirements is estimated to have existed in the second quarter of 1946. This is nearly a million tons less than the indicated shortage in the first quarter. . . . On the other hand, inventories at mills, distributors and consumers are probably around 1,000,000 tons below the prewar level in relation to sales volume which is a DEMAND factor apart from and ABOVE the indicated consumption requirements."

That adds up to 5,000,000 tons shortage. And, as 57 per cent of the total production requirement would be wood pulp, it calls for a total of 2,850,000 tons of new wood pulp production—or, the equivalent production of 23 mills making 400 tons a day for a 310 day year.

About 500,000 tons per year of new wood pulp production is projected and part of that projected tonnage will come from the United States investment in Canada.

Another factor of importance. In the years, 1942-43-44-45, the United States not only failed to equal its 1941 production total of 17,762,365 tons of paper and paperboard, but it lost over 2,300,000 tons cumulatively in those years following 1941. It had the facilities, but not the fiber.

So, now, confronted with a vast growing industrial expansion creating a prodigious demand that is worldwide in scope; with a 5,000,000 ton greater consumptive demand than its fiber resources can supply; with a governmental pricing control that hamstrings its operations; with the domestic forests vanishing rapidly from the impact of an abnormal demand from wood for building and wood for pulping and no national forest conservation system "worthy of the name" in force on our statute books; with the unprecedented purchase of going mills by publishers, converters, and distributors, taking thus far some 1,500,000 tons of production out of the commercial markets yearly, all testifying to the revolution going on in the paper industry, the outlook for increased pulp and paper supplies for the consumers of pulp and paper products from now until 1950, is not a happy one.

"What's Wrong With Radio? . . . The Audience!"

WILLIAM SIBLEY

▶▶▶ IN A RECENT ISSUE of *Media Buyer*, published by the Buyer Publishing Company, New York City, there appeared an article under the above title, written by the trenchant, if not vitriolic, Henry Morgan. What Mr. Morgan has to say is so pat and direct a digest that it is jolly well worth repeating. However, I warn you, if your blushes are painful or you cannot abide being laughed at, you had better turn the page now and start reading the advertisements.

"What's wrong with radio? The Audience!" Well, that's about all there is to it except for a bit of documentation which shouldn't take too long.

"A reliable modern neuropsychiatrist knows that part of the patient's trouble stems from his inability to cope with the specific socio-economic relationships to which he's been exposed. There are many neurotics in radio who are suffering because they are people of great talent, pitifully frustrated in their work. Their 'socio-economic relationship' is killing them not because the sponsor won't pay for 'good' programs, but because you won't listen to them. So the writers, producers, actors, et al., are forced to be Grade B people.

"The theory has been advanced by somebody, who shall be nameless, but at present is called Ebenezer Gonfalon, that 'radio itself educated the listening audience to tripe'; that the reason for our being the mightiest nation on earth in the amount of sponsored junk that the poorest citizen can share with the wealthiest is that that's all they could get for years. But for every bad program you can think of that's been on the air for years, I name five good ones that nobody listened to and that had to be taken off. Now I'll tell you how we know that nobody listened!

"For years the only measurement of audience response was mail. A broken-down poetry reader with schmaltzy organ music in the background would get a letter from every unattached female (and many attached) for a thousand miles around.

"In its early years radio was enoug of a novelty to get away with tha kind of murder. You may not believe it, but fifteen years ago when a station put on a symphony orchestra it would get complaints from listeners—and a lot of them, too. But, that was fifteen years ago. We still get them. Anyway, as far as radio could tell from the mail, the audiences wanted junk. Loved junk. But there was no way of telling what percentage of the audience was writing or what section of the populace was represented, so a better way had to be found.

"We'll leave out a couple of experimental jabs made by a number of people and jump to the Hooper ratings. C. E. Hooper is a gentleman I know nothing about, but I know his survey works. His minions make a certain number of random phone calls at specified times every day. That is, if they make one hundred calls on Monday from 6:45 till 7, they'll make them at that time each Monday night. 'Are you listening to the radio? What program? Who's the sponsor?' Something like that.

"The theory (fact) is that the same number of calls made under the same conditions over a long enough period of time will supply fairly accurate figures as to what the telephone owners, at any rate, are listening to. You can figure out the flaws in this if you want to, but it won't do you much good. Mathematically Hooper is bound to be right in the long run. And it's simpler than counting their ears and dividing by two.

"Of course, the Hooper method doesn't tell much about the listener's financial status. If it did, it wouldn't tell you anything about how much money the listener can be talked out of. If there's an audience of twenty millions, say, when the silver-tongued happiness boy gets finished thrilling himself with his sales talk, how many of the twenty millions rush into the night to buy Morgan's self-leveling ribo-flavin? Deponent sayeth not. But sponsor sayeth. Cash register knoweth. Incidentally, the figures on sponsor-identification are none too pleasing—but that's another story.

"Let's recapitulate before I forget what I'm doing. We've postulated that: radio is full of frustrated talent; that it doesn't truck with art, but could; that it didn't educate the audience to bad things; that, to judge from the mail, listeners were people of no discernment; that today we know what people listen to, whether they write in or not.

"What do we find? I hoped you'd ask me that! Well, sir, we find that with you, the audience, the most popular programs on the air today, both from the ratings and from sales made, are of poor quality. Poor, mind you by the standards of the people who produce them. Sniveling, little serials about 'What will happen now?' Boorish comics making endless references to the heavy mist in California, to girls who are so fat that—, ceilings so low that—, hotel rooms so small that—; audience-participation shows where the poor quiz-master is forced to tell jokes to cover up the *astounding stupidity of the contestants.* (For even a $10 price you can fill a large studio endlessly with the terrifying result of mass education.)

"Everyone connected with quiz programs is *contantly astounded at the enormity of the average man's ignorance;* when the contestant, by dint of superhuman effort, is able to enunciate the stupendous knowledge that he 'comes from Brooklyn' the deafening applause from the studio audience testifies that they're every bit as bright as he.

"To date radio has broken an arm and a leg trying to bring the audience up, rather than bring itself down. Every day it gains an eighth of an inch. At its worst it's infinitely superior to what is done in any other country, since no Government bureau tries to run it. The people who run the thing would love to do what they know how to do but they won't do it—unless you listen. *You're* what's wrong with radio."

Of course, you should remember Morgan's talking about the public—not about YOU.

NEW!

Measure and Control

Temperature
Pressure
Level
Flow
Flow Ratio

Speed
Conductivity or pH
Per Cent Oxygen
Per Cent Combustibles
Motion or Position

with STANDARDIZED Electronic Instruments

Standardized Bailey Electronic Instrument for indicating, recording and controlling the factors listed above.

FEATURES

1. Sustained accuracy and stability insured by careful design and the use of the null balance principle.
2. Trouble free service insured by sturdy Electronic Detector which replaces moving parts and delicate instrument suspensions.
3. Comparison of related factors made easy by continuous records of as many as four factors on a single chart.
4. Maintenance simplified by easy access to all parts and by exchangeable unit assemblies.
5. Attractive control panels assured by identical styling of all recording instruments.
6. Panel space saved by installing two controllers in one instrument.
7. Choice of three controls—air, on-off electric, modulated electronic.
8. Easy installation—no careful leveling or protection against vibration.

Ask for Bulletin 231

BAILEY METER COMPANY
1058 IVANHOE ROAD • • • CLEVELAND 10, OHIO
Controls for Processing

TEMPERATURE
PRESSURE
% OXYGEN
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FLOW
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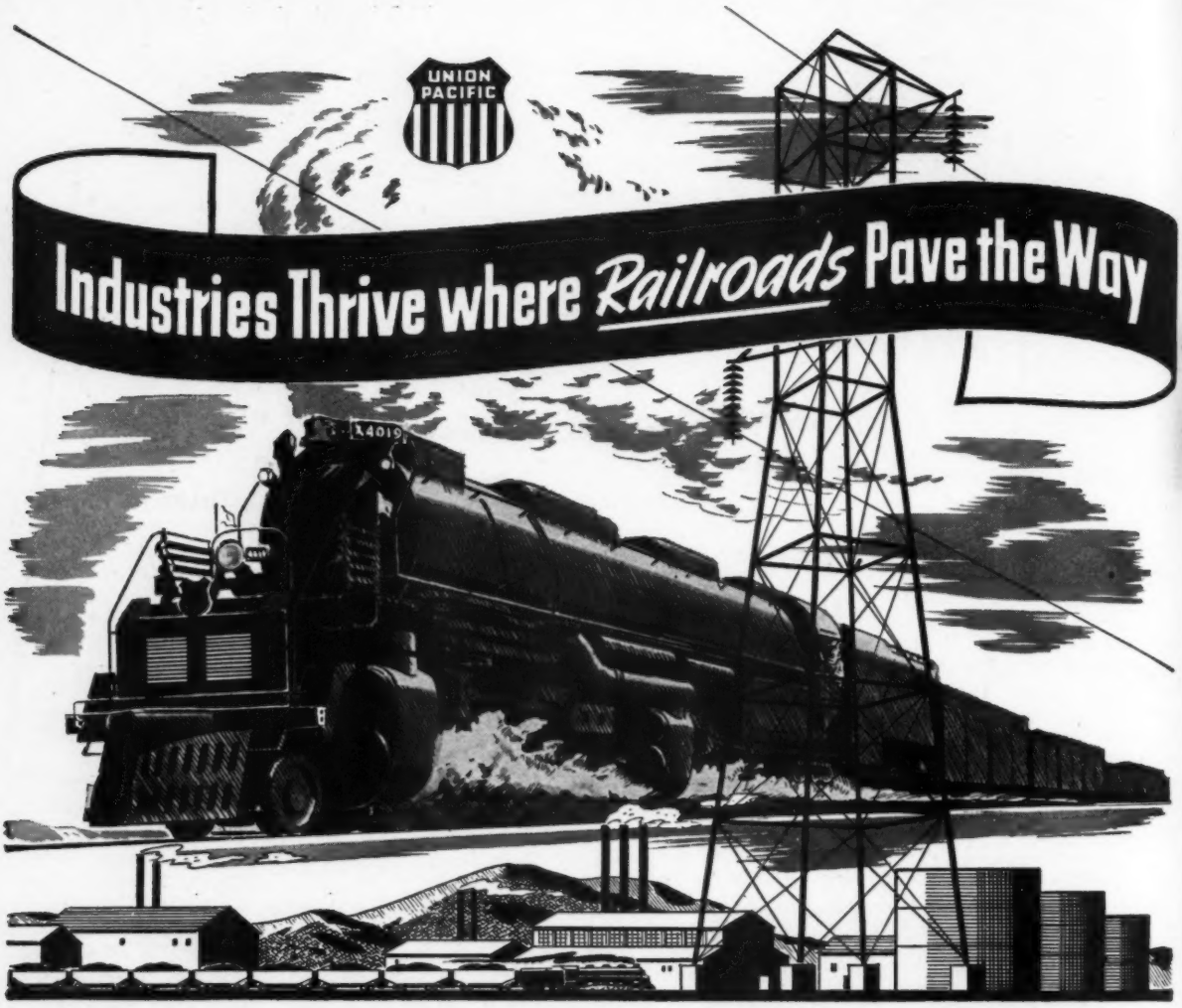


WITH the coming of the railroads, the western frontiers were conquered. They brought men, implements for building homes and towns, transportation for marketing products. Then factories were built. And industries thrived where railroads paved the way.

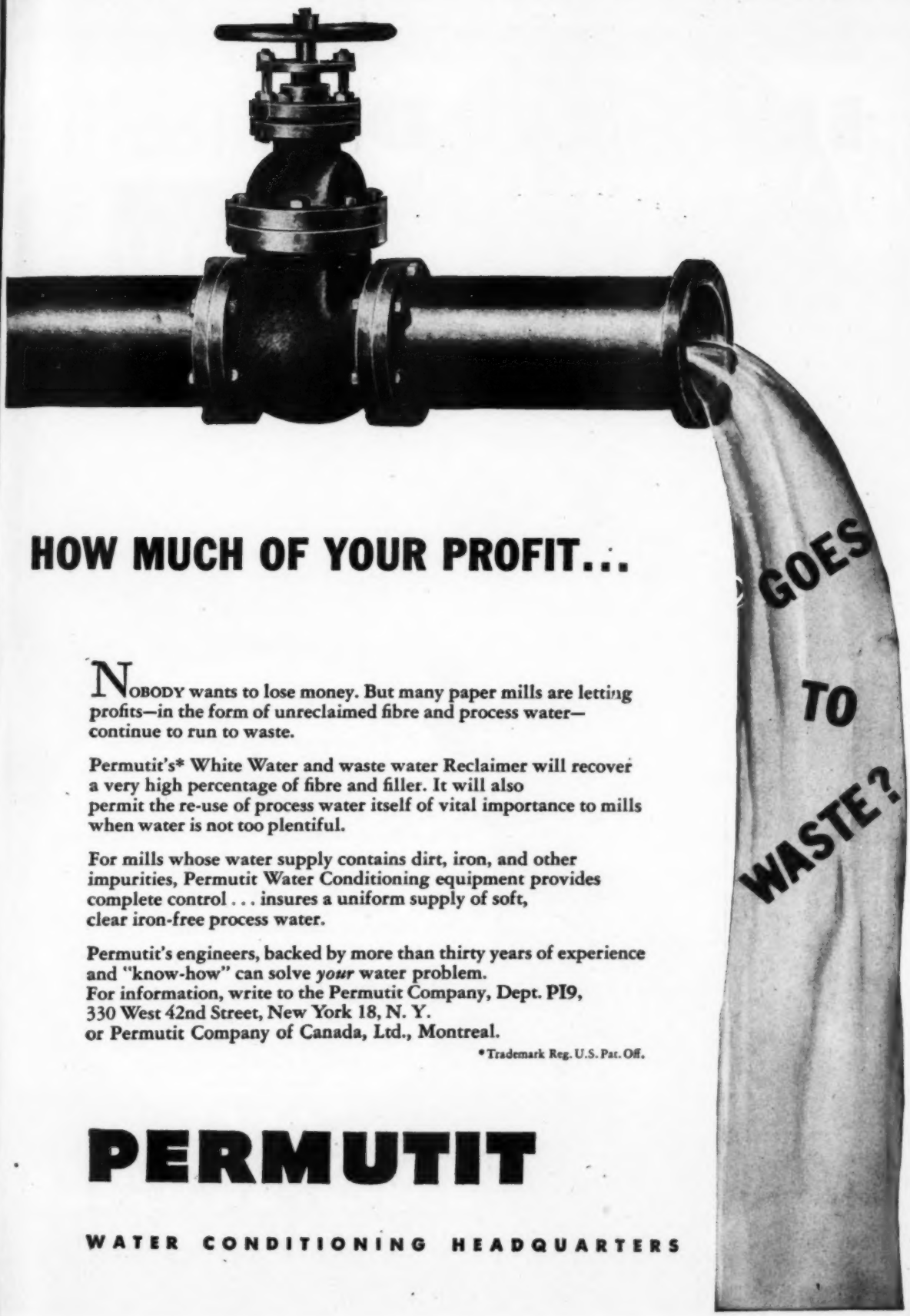
In the 13 great states served by Union Pacific, there still is land to be tilled, minerals to be unearthed, livestock to be raised, room for new homes and industrial expansion.

Union Pacific will continue to serve the territory it pioneered, by providing efficient, dependable, safe transportation for shippers over the time-saving Strategic Middle Route.

be Specific –
say "Union Pacific"

★ *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

UNION PACIFIC RAILROAD
The Strategic Middle Route



HOW MUCH OF YOUR PROFIT...

NOBODY wants to lose money. But many paper mills are letting profits—in the form of unreclaimed fibre and process water—continue to run to waste.

Permutit's* White Water and waste water Reclaimer will recover a very high percentage of fibre and filler. It will also permit the re-use of process water itself of vital importance to mills when water is not too plentiful.

For mills whose water supply contains dirt, iron, and other impurities, Permutit Water Conditioning equipment provides complete control . . . insures a uniform supply of soft, clear iron-free process water.

Permutit's engineers, backed by more than thirty years of experience and "know-how" can solve *your* water problem.
For information, write to the Permutit Company, Dept. PI9,
330 West 42nd Street, New York 18, N. Y.
or Permutit Company of Canada, Ltd., Montreal.

*Trademark Reg. U.S. Pat. Off.

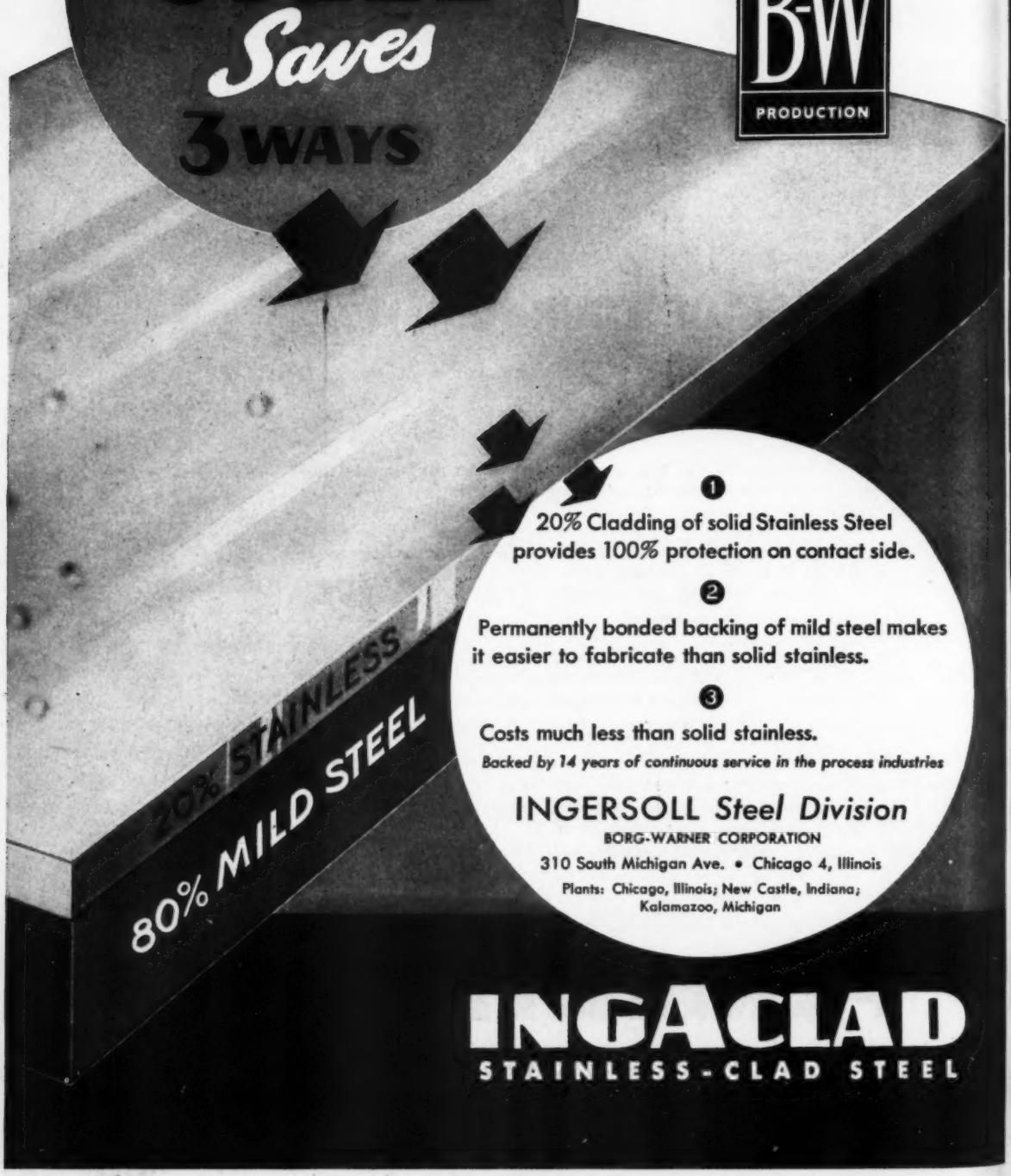
PERMUTIT

WATER CONDITIONING HEADQUARTERS

INGACLAD

STAINLESS-CLAD STEEL Saves 3 WAYS

ENGINEERING B-W PRODUCTION



❶ 20% Cladding of solid Stainless Steel provides 100% protection on contact side.

❷ Permanently bonded backing of mild steel makes it easier to fabricate than solid stainless.

❸ Costs much less than solid stainless.

Backed by 14 years of continuous service in the process industries

INGERSOLL *Steel Division*

BORG-WARNER CORPORATION

310 South Michigan Ave. • Chicago 4, Illinois

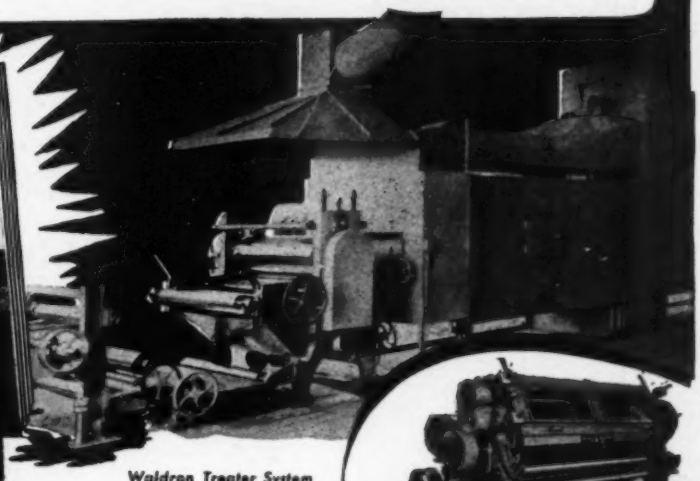
Plants: Chicago, Illinois; New Castle, Indiana; Kalamazoo, Michigan

INGACLAD

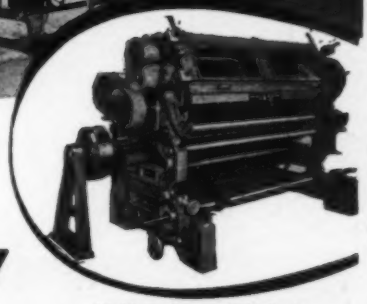
STAINLESS-CLAD STEEL

Plastics *Treated* Papers
provide remarkable new materials

Reduced reproduction of article published in May issue of Plastics magazine



Waldron Treater System

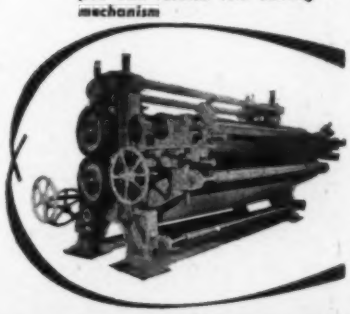


Waldron Reverse Roll Coater for applying plastics solution

and the machines that make them possible are built by

WALDRON

Waldron Treater Head equipped with reverse roll coating mechanism



The Waldron Treater System illustrated above is a complete machine line consisting of Waldron mechanical treating apparatus in tandem with Ross Engineering air processing apparatus.

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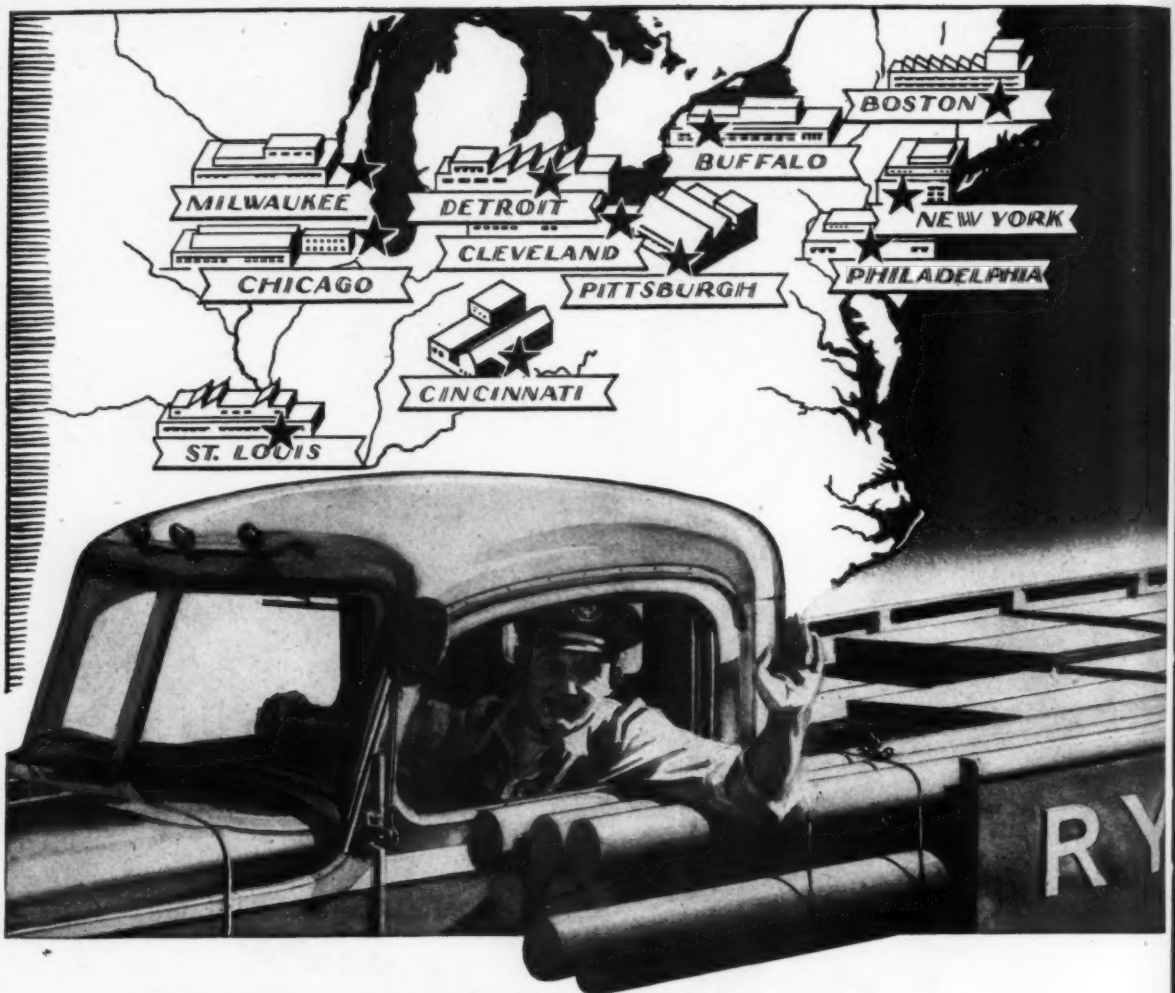

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SEPTEMBER, 1946

Paper Companies Must Prepare for the Uncertain Future

CLINTON DAVIDSON, President
Management Planning, Inc.

▸▸▸ ONE OF THE PRIMARY problems confronting management in the paper industry today is that of preparing financially for the uncertain future. The wide swings to which the business is subject dictate a policy of looking well ahead—not only discerning the downward turn of the cycle as it affects production and sales, but also keeping in a position to meet financial contingencies which, in one form or other, are bound to arise.

Most great wars in the world's history have been followed by alternate periods of inflation and deflation. We are now in a period which is similar to 1919. We then had an inflationary boom which lasted about two years, followed by a "bust." This, in turn, was followed by approximately seven years of prosperity. It is doubtful if anyone is wise enough to tell us what the financial changes in the paper field will be over the next ten years, but it is safe to say that there will be drastic changes—and that they will happen *suddenly*—and, to many people, unexpectedly.

It is not crying "Wolf!" to wonder whether paper sales, for instance, may not fall some day from their present high level to their prewar volume. It is only *sound planning* to prepare for such a contingency. Yet there are companies in the paper industry whose annual bond interest today exceeds their prewar earnings before taxes and interest. Unless this bonded debt is reduced or eliminated, what will such companies do if paper sales fall to 1938 proportions?

It is well known that paper companies have pursued different financial policies in different years. One factor, of course, has been the relative stability of earnings in the particular branch of the industry, because this determines how far a given company should go along the route of conservatism at this time. Another factor has been a difference in viewpoint regarding earnings per share of common stock. Some companies have found it possible to increase earnings per share substantially by taking advantage of the current unusually large investor demand for senior securities, especially bonds. These companies have increased earnings for common stock in two ways: first, by selling senior securities—including bonds—to finance expansion of plant and equipment, and to secure subsidiary companies; second, by refunding outstanding senior securities with others bearing lower interest rates.

Other paper companies have taken a different stand, placing a premium on long run, rather than the immediate, welfare of the common stockholder. The managers of these companies believe that the common stockholder would rather earn a little less per share of stock during the present boom in order to be sure his company will avoid bankruptcy in the next depression and will be able to raise any future money needed for expansion, regardless of the condition of the stock market at that time.

Several years ago, the capital stock of one of our clients in the paper industry consisted of 5 per cent preferred and common stock. The 5 per cent figure had become outdated, and the company could have put out a bond issue at around 3 per cent, or a bank loan at slightly over 2 per cent.

Clinton Davidson, author of this article, is widely known in financial and top management circles. He organized the Estate Planning Corporation in 1925, serving as its president until 1941, in which capacity he planned the personal estates of wealthy men, aggregating in excess of $2-billion. In 1931 he organized Fiduciary Counsel, Inc., which currently supervises approximately a half billion dollars of investments for about 85 families. He is not an officer of either organization at present but he retains a substantial ownership interest in each.

Management Planning, Inc., of which Mr. Davidson is president, advises corporations on all fiscal problems including recapitalizations, needs for additional capital, the best sources for acquiring such capital, etc., and acts as negotiator in selling or buying businesses. Mr. Davidson negotiated the sale of the Crosley Corporation to the Aviation Corporation.

The individual clients and the directors of the corporate clients, of the companies Mr. Davidson organized, are directors of 709 corporations. The broadest possible contacts and unusual research, statistical and tax facilities are, therefore, available to Mr. Davidson, as is evidenced by this article.

Instead, the decision was made to sell convertible preferred at approximately 4 per cent. Why? Because the managers were sure that if the upward swing continued, they would be able to convert the preferred into common stock—and that is exactly what happened. Senior securities were reduced from 28 per cent of total invested capital to zero, and the company still retained enough capital to keep it safe, and that capital now has no preference over the common stock.

As a result of this sound method of refinancing, this company is now in perfect condition to weather any economic storm or sudden wave of price cutting. Furthermore, if the company wishes to expand in any desired direction—even if the stock market is low or inactive—it will have no difficulty in either issuing bonds or selling preferred stock.

Another interesting case involves a paper company which found itself overburdened with senior securities. Approximately 55 per cent of its capital structure was in the form of funded debt and preferred stock. A new issue of common stock was sold, in sufficient amount to retire the bonds. Now the company has 85 per cent of its total invested capital in common stock and surplus—and is well prepared for any eventuality. A third firm in the same industry sold enough additional common stock to its own shareholders to pay off a large bank loan, raising its common stock and surplus from 83 per cent of total invested capital to 100 per cent. If this company should need to raise additional capital at some time in the future when the stock market is unfavorable, it will have no difficulty borrowing large sums from banks or selling bonds to institutions.

Contrast the position of these companies, during the uncertain period ahead, with that of certain other firms in the paper industry whose percentage of capital comprising bonds and other senior securities has gone *up* during the current boom. For example, one firm whose capital structure our Research Department studied, entered the war period with a large amount of bonds outstanding. As sales increased and additional capital was needed for expansion, the company sold more bonds in order to take advantage of low interest rates. When the downward swing comes—as it will—this company will not be as well prepared as the others. Security and maneuverability have been sacrificed for a temporary ability to increase net profits as much as possible, by having low cost of capital and by having that cost deductible for income tax purposes.

It goes without saying that having the most suitable form of capital structure is not enough. Equally important to every paper company, if not more so, is that there should be *ample* cash capital. How much *is* ample? Enough to meet all foreseeable needs, plus those unexpected, unforeseeable needs arising from economic and political changes. It is far better to have too much than too little, because future hazards are all too easy to underestimate, both as to degree and to duration.

There never was as good a time for corporations to prepare their capital structures against financial uncertainties. There is more capital available than we have ever known, and the price is lower than we have ever seen it before. Every financial executive realizes that it is important for his company to enter the next depression with ample cash on hand. Despite this, more companies will fail in the uncertain years ahead because they did not secure ample cash capital when they could have done so, than for any other reason.

How Estate Problems Affect Companies

Many companies in the paper industry are closely held, and this poses a two edged problem, because there is a close relationship between the financial welfare of the company and that of its principal owners. This relationship works both ways. The impact of changing conditions upon the corporation itself has a direct effect upon the owners, for obvious reasons. The reverse also is true, because if the owners of closely held corporations do not properly prepare for their own uncertain futures, the corporations will be affected adversely in many ways. Here is a case in point:

The president of a company, all of whose wealth was tied up in that company's stock, decided to sell 2,500 shares, so that his family would not be at too great a disadvantage under the inheritance tax laws. He did not discuss it with his treasurer or controller, because he thought it was purely a personal matter. But after 100 shares a day had been sold for about three days, word got around the community that the boss was selling his stock. A few days later, a Wall Street banking house started selling the 60,000 shares that it held for its clients, and the price went down 30 per cent. How was the company affected? That company's business is expanding, and it intends to seek additional capital. If a convertible preferred is sold, the company will probably have to accept a lower conversion figure, with a consequent dilution of the earnings of the present shares. If the company sells common stock, it will have to sell more shares for the same amount of capital raised, which again means a dilution.

It is impossible to separate the estate planning of such an individual from the financial planning of the company. Consider this instance—an actual situation that confronted the chief owner of a small, but important, concern:

"I am sixty-six," this executive told us. "Everything I have is in this business. There is no present market for its stock, so I have no idea what value will be placed on it for estate tax purposes when I die. I don't know how the money required for these taxes will be raised, and I don't know what will happen to the business or my family after my death.

"I have two sons working for me in the business, and a wife and daughter who know nothing about the business. I don't want either my wife or my daughter to be dependent upon it after I die, because it is subject to too many uncontrollable hazards. I have had lots of free advice from people who have their own axes to grind, but no two of them are in agreement. Some years ago, for instance, an insurance friend arranged a contract whereby the company took out insurance on my life for the purpose of buying stock from my estate after my death, but my attorney says that the plan no longer has its original advantages. Another insurance man sold me $200,000 of personal life insurance that is now subject to estate tax at very high rates, so the net amount available to pay taxes will be small.

"One investment banker has been trying to persuade me to sell out the entire business. Another has proposed a merger with another company, to be followed by a public issue of securities. One broker tells me I must recapitalize and issue more common shares in order to retire the preferred, while my bank suggests that we use bank loans for that purpose. A local investment dealer who has connections with a life insurance company suggests that we sell debentures to that firm. Our local bank has recommended that we borrow additional cash. To top it off, another company in our industry has offered to exchange its stock for ours.

"Now in the midst of all this, my attorney says that I should make large gifts to my family, with those for my wife and daughter being in trust and those to my sons outright. I feel like the man who was advised to jump on his horse and ride off in all directions!"

This is not an isolated case. It is typical of thousands which come up

every year—cases in which owners of closely held corporations are caught between the millstones of conflicting advice and conflicting interests. . . . "What can I do for my heirs that will not hurt the future of my company and its employees? What can I do to protect my company and my business associates against the uncertain future without increasing the hazards it holds for my family?"

There is only one way out of this difficulty, and that is to consider the two problems as one. The future of the corporation and that of the owners and their heirs must be regarded, not as separate spheres of interest, but as the two sides of a coin. You cannot spin one without spinning the other. Heads or tails, they win or lose together.

The Role of Mergers

In addition to providing the proper capital structure and securing ample cash capital while it is so easily obtained, many corporations can protect themselves against future hazards through mergers; by buying some other company and embodying it as a division, or by selling a devision which does not fit their business so well under today's changed conditions. Here are some examples, taken from other fields, which have many counterparts in the paper industry:

The problems of a company whose earnings went up and down with the iron and steel industry for some thirty years was solved by purchasing other companies of approximately the same size whose earnings followed different cycles. These steps were taken separately, and no company was acquired until the process of adjusting the previous purchase had been completed. The company which resulted from these mergers and acquisitions is now a steady earner. It produces regular income for the stockholders, is in a much better credit position, and is safer all the way round.

In one industry recently investigated, one company has a product that is outselling all others, but it has nothing on the production line to replace it 15 months hence. Another company does not have a good seller today, but it has a product coming up that will unquestionably lead the field 15 months from now. Another company in this same industry is famous for design and production, but it is completely lacking in sales promotion and advertising. Another, on the other hand, is in the newspapers and on the air almost every day, but it will soon have nothing to sell. One company has a very small backlog, but has large excess working capital, while another has so many orders it will soon have to secure additional capital. Even a blind man can see that several mergers can be made, very appropriately, in that industry.

Compensating Management

One of the greatest hazards facing business—and especially the closely held corporation—today is that of compensating management. No business is better than its management, and sustained quality of management depends upon incentives. This used to be achieved with great success through profit sharing, but it does not work today because high tax rates have annulled it. For instance, consider the case of the executive vice president of one company who receives a salary of $5,000 a year plus 5 per cent of net profit before taxes. This percentage arrangement was entered into just before the war, and he received $200,000 the first year. Two years later, the high tax brackets eliminated all of the incentive.

Many corporations have tried to meet this condition by giving their top executives options to buy stock at favorable prices, but again the tax laws have removed practically all the reward, or at least have clouded the subject with such great uncertainties that the incentive is eliminated.

There are two solutions to this problem. The first is to secure a change in legislation which will make the use of options to purchase stock as attractive as they were formerly. The second—and more feasible immediately—is to make arrangements for managers to purchase stock in the company.

In cases where the stock of the company is closely held, stockholders often are reluctant to give up any part of their ownership interest. Another frequent obstacle is the financial inability of the managers to buy a sufficiently large block of stock* to make the managers' interest worthwhile.

Some Typical Decisions

It can be seen from the foregoing that preparing for the uncertain future, on the part of both closely held corporations and their owners, involves a combination of experience—i.e., investment counsel experience, estate planning and management planning. Without this background and experience—either in the firm itself or secured through an outside agency—how can the executives of a company decide:

1) Whether preferred stock should be used, and if so, which of the ten forms is best?

2) Whether bonds should be used, and if so, how to answer the twelve pertinent questions regarding the different types available?

3) Whether common stock should be used, and if so, how to make five decisions wisely.

4) Whether bank loans should be used, and if so, how to analyze the seven pertinent features of such loans.

5) Whether the company should merge with, or purchase, another company.

6) In the event additional capital is needed, which of the eight available sources should be used?

The one best way would have to be that which is most beneficial to the corporation and its executives and employees, and which best protects the business *and its principal owners and their heirs* against the uncertain future.

Summary

This subject may be summarized by the suggestion that the owners and managers of paper companies, in preparing for the uncertain future, give consideration to the following:

1) The future for corporations is more uncertain today than at any time in the past.

2) Financial preparedness is easier—and less costly—to accomplish than ever before in our history.

3) When new capital is raised, however, it is important to raise *enough*—and to do so in the form which avoids unnecessary risk.

4) Costly fluctuations can be avoided by means of mergers and consolidations designed to round out production and distribution, and to "stagger" the earnings cycles.

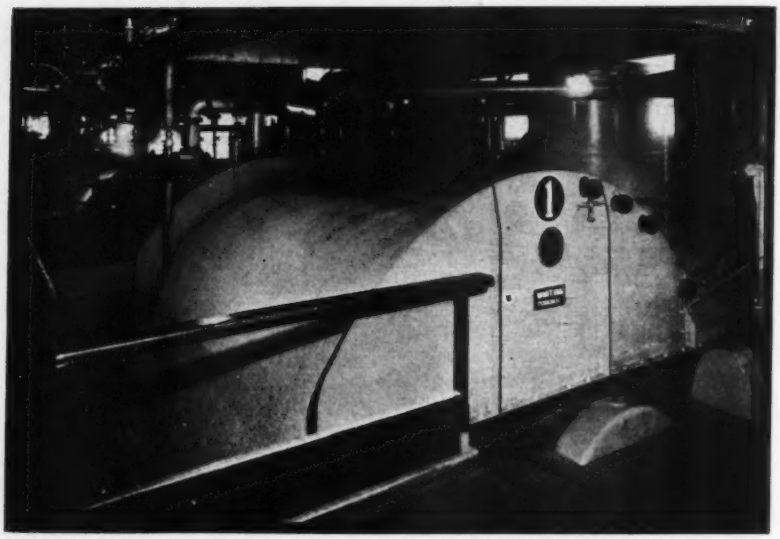
5) Management must be provided with adequate incentives, the best of which is the acquiring of an ownership interest in the company.

6) The estate problems of large stockholders must be taken into consideration in all financial planning for the corporation. In other words, the controller's function ideally combines fiscal counselling and estate planning.

7) When additional capital is needed, eight sources are aavilable. The task is to analyze each and select the one which best fits the company's needs.

As busy as financial management is today, this program is not optional; it is imperative. Unless paper companies grapple with this problem of financal preparedness for all contingencies—including those which grow out of the principal owners' personal estate problems—they will be unable to protect their businesses against the uncertain future.

(*) In addition to stock purchase options, Management Planning, Inc., has discovered and tested out five solutions to the stock purchasing problem. These are set forth in detail in a book entitled Fiscal Counsel Plus, which bears the firm's imprint and will soon be available for distribution.



Single drum two-stage washer operating on bleached kraft pulp in Canadian mill

The Dilution Factor in Brown Stock Washing

J. R. LIENTZ, Manager*
Pulp and Paper Department
Swenson Evaporator Company

▶▶▶ WASHING OF BROWN stock in a kraft pulp mill is an important problem occupying the continued attention of mill operating and technical men. Because of the varying characteristics of the material handled and the wide range of techniques used by mills for washing kraft pulp, there has been little incentive to publish data or to compare more than general ideas of operation.

The difficulties of obtaining reproducible results in diffuser test work are numerous. Carefully conducted experiments, metering all flows to and from the diffuser, and elaborate procedures for sampling and measuring the washed stock have not offset the inability to observe and control pulp distribution or the tendency to channel inside the diffuser during the washing cycle.

Most published technical studies on diffuser room operation have been limited to comparisons of washing time, over-all chemical losses, and liquor strength to storage. Material balances around the diffuser room generally consisted of average figures difficult to correlate against controllable variables.

Within the last fifteen years the use of rotary vacuum pulp washers has been rapidly extended. Early rotary vacuum pulp washing installations were complicated by problems of foaming, poor layout, inefficient equipment design and lack of control equipment. It was some time before the ideal of a "closed system" became a reality. However, the advantages of uniformity of product, flexibility of operation, potential efficiency and low operating cost served as incentives to constant attention and improvement of each installation.

The definition of efficient washing operation has changed considerably since 1930. Early installations of single-stage drums or two in series were inefficient from the standpoint of water requirement, soda loss and foaming difficulties. In most mills, chemical and fuel costs were relatively low and the ability to produce pulp satisfactory for conversion was the primary operating consideration.

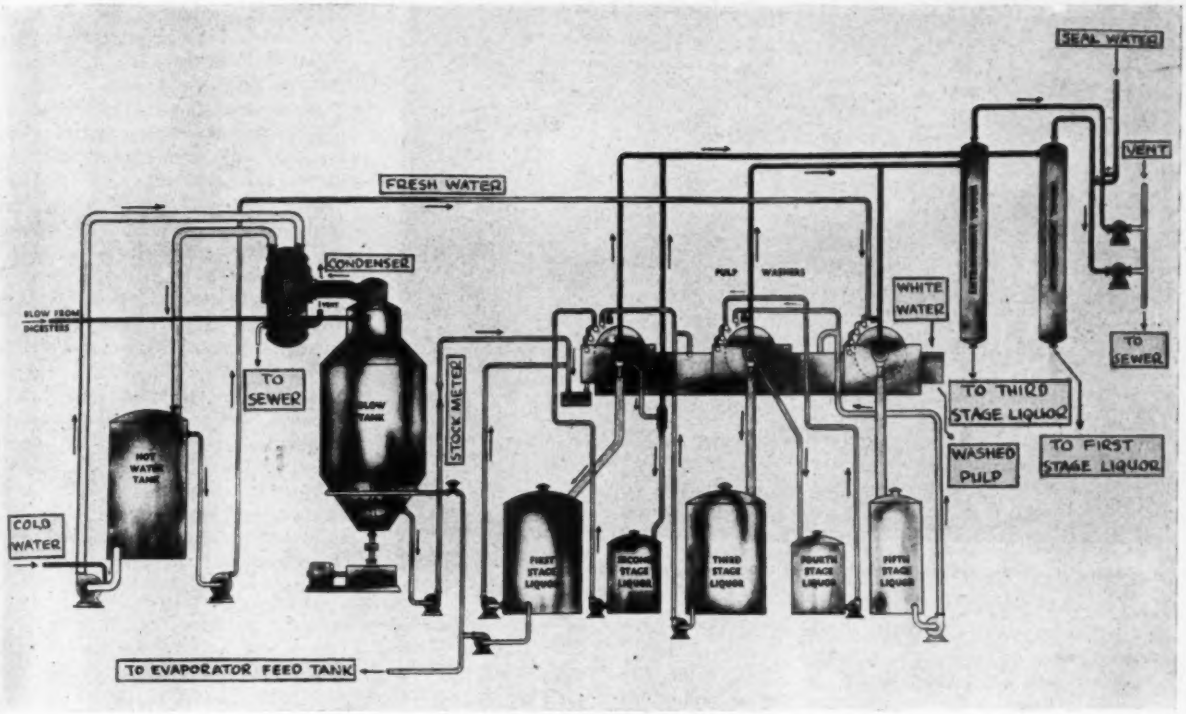
Current antistream pollution legislation has emphasized the need for closing the washing system and minimizing the soda content of the washed pulp so that there is no loss of chemicals to the sewer, either from the washing system itself or in the subsequent operations of knotting, screening and thickening. Rapidly increasing chemical costs have made maximum chemical recovery more profitable. At the same time increasing fuel and steam costs have emphasized the necessity of minimizing the evaporation load by reducing the quantity of wash water used on the pulp.

For the analysis of pulp washing operations, the concept of "dilution" has been developed as a measure of washer room efficiency. Dilution has been defined by Grieve (Grieve, John R. W., *Pulp and Paper Mag. of Can.*, July, 1945, pp. 601-605) as "that part of the total wash water that passes through the sheet and into the liquor system." This is commonly expressed as a dilution factor in terms of pounds of water into the system per pound of air-dry pulp. When the system is closed, this is a direct measure of the evaporation load which results from the pulp washing operation.

Modern instrumentation and relatively simple laboratory control tests have made it possible to calculate dilution without difficulty. In general, a series of samples of the washed pulp leaving the final drum is taken for compositing and analysis for total sodium sulphate and per cent B.D. consistency. Many mills are able to calculate average production rates from the number of cooks blown to the washing system. Where this is not practical, a procedure has been developed for measuring capacity by securing washed pulp samples of a known cross sectional area and determining the dry weight. The tonnage is then calculated from the drum width and drum speed. The latter method has been found to check very closely when compared to measured digester yields.

The water leaving with the washed pulp is then calculated from the production rate, sheet consistency, and soda loss. Finally, the dilution is the measured water flow to the system minus the water out with the sheet (Table 1.).

(*) Since this article was written, Mr. Lientz has become associated with Union Bag and Paper Company, Savannah, Georgia.



Flow sheet of three-drum five-stage pulp washing system

It has been a common practice on the part of some mill operators to evaluate the efficiency of one washing system with another by comparing "Baumé drop," i.e., the differential between the blow liquor concentration and the concentration of the liquor leaving the washing system. A study of the dilution concept has revealed that such conclusions are misleading because the effect of the consistency of the blow is neglected.

Let us assume a blow liquor strength of 21 per cent total solids (14 deg. Baumé at 60 deg. Fahr.) and a dilution factor of 2.3 pounds of water per pound of A.D. pulp when washing to 30 lb. Na_2SO_4/ton of A.D. pulp in a closed washing system. We shall then vary the blow consistency from 9 per cent to 10.5 per cent to 12 per cent B.D., which is a normal range for kraft pulp, and shall calculate the strength of the liquor to the evaporator in every case (Table 2).

The results of these calculations indicate that the measured strength of the liquor leaving the washing system will vary considerably as a result of conditions beyond the control of the operator of the wash plant itself, even though the dilution factor is constant. the liquor leaving the washing system increases as the number of stages increases—assuming, of course, that operation is in a closed, counter-current manner. Liquor is displaced in each stage by weaker liquor so that the residual chemical content of the sheet is lower as it leaves each successive stage. Regardless of the efficiency of displacement of each stage, the more times the liquor is used for displacement, the less water must be added as dilution on the final washing stage. This situation might be compared to an evaporator heat balance in which for a given set of capacity conditions, a multiple effect installation may be designed for a wide range of steam consumption, depending upon the number of effects used. At the number of stages increases, the steam demand proportionally decreases.

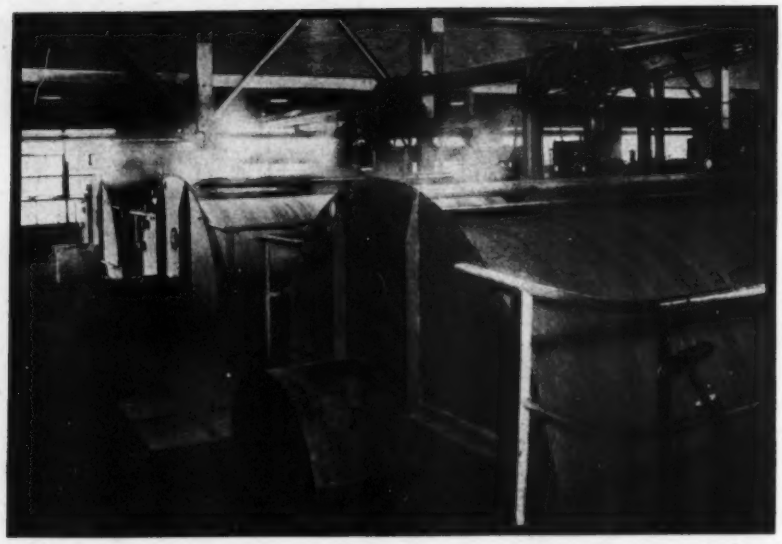
Present-day vacuum washers are built so that individual drums may be operated as one stage or multistage units. Units of 3, 4, 5 and even 6 stages are installed in many mills. These might be in various combinations such as 3 multistage drums in series to form a 5- or 6-stage system or 4 single-stage drums in series to form a 4-stage system. Such combinations require the use of repulpers between drums with the introduction of a dilution type of washing instead of the displacement washing obtained when the mat is formed on the drum itself.

Depending upon many variable conditions of operation, the repulpers may or may not add to the washing efficiency of the system. There are gains to be made by rearranging the sheet to reduce the liquor concentration on the bottom part of the mat. Where many knots and shives are present, a rearrangement of the sheet removes the spots around the knot which can-

TABLE 1

Assume	(1) pulp production 16 tons/hr. A.D. (2) washed pulp consistency 16% B.D. (3) soda in washed pulp 30# Na_2SO_4/ton A.D. (4) total wash water 430 GPM.
Production is	16 × 1800 = 28,800#/hr. B.D. pulp 16 × 2000 = 32,000#/hr. A.D. pulp
Pulp sheet off is	28,800/.16 = 180,000#/hr.
Total solids in washed pulp	30 × 1.74 × 16 = 830#/hr.*
Total liquor in washed pulp	180,000 — 28,800 = 151,200#/hr.
Total water in washed pulp	151,200 — 830 = 150,370#/hr.
Total wash water applied	430 × 500 = 215,000#/hr.
Dilution	215,000 — 150,370 = 64,630#/hr.
Dilution factor	64,630/32,000 = 2.02#H_2O/#A.D. pulp

(*) Factor 1.74 is the stoichiometric ratio based on the assumption that normally about 25% of the total black liquor solids is equivalent Na_2O.



A modern three-drum five-stage system in continuous operation on kraft board pulp

not effectively be displaced by the shower liquor. This is true provided conditions are not set up in the repulping operation which prevent good formation of the sheet on the succeeding drum and a resulting inefficient displacement of the liquor in the drum mat itself. In many cases, the discharge from the repulper is so full of air and foam that a very thin and impenetrable mat is formed on the next drum, and production capacity can be maintained only by running the drum at a high speed and high submergence. The result is that the drum discharges a very wet sheet to the next repulper and the entire stage acts primarily as an inefficient thickener instead of a washing unit.

Ideally, the pulp blown from the digester should be drained to a high consistency before it is diluted for the washing operation. If, for exam-, consistency before it is diluted for the pulp until a consistency of 30 per cent B.D. was obtained, we could recover approximately 70 per cent to 80 per cent of the liquor directly at the strength at which it was blown. The unwashed pulp could then be diluted so that the concentration of liquor around the pulp would be lower when the sheet was initially formed on the first drum.

In conventional practice, however, the blow is immediately diluted with the strongest liquor available in the system to the consistency at which the more effective formation of the mat is obtained on the first drum. The strength of the liquor in the vat of the first washer is only slightly greater than that leaving the system. As a result, the important factor in the efficiency of the installation is the ability of the washer drum itself to form a mat of pulp which is uniform across the drum which can be washed with minimum disturbance of the surface fibers and which can be dried to the highest possible consistency before passing to the next stage.

Once the sheet is formed on the drum, the primary requirement is to remove as much of the initially adhering liquor as possible by a combined displacement and drying operation. To obtain the best results, the distribution in the vat must be proper for uniform formation of the mat across the entire face of the drum. Even application of vacuum during the pickup period is important to avoid forming a tight skin on the surface of the drum and a lumpy cake above this surface. Gradual application of vacuum during the pickup period is advantageous. This is best controlled by use of a vacuum pump which insures an even and positive displacement of air through the drum section from the time the section opens into the pickup zone of the filter. The use of a vacuum pump is limited only by the ability of the tank system to handle the additional foam which in some cases is produced by the pump operation. Many existing installations could undoubtedly operate more efficiently if they were able to take advantage of the use of a vacuum pump.

After the sheet is formed, it should immediately leave the submerged section so that a maximum time is available for applying liquor showers and dewatering. Ideally, then, the most effective drum should operate with a low submergence, long washing and drying cycle, and short blanked area. Use of a vacuum pump effectively reduces the required submergence by providing more rapid drainage. A slow drum speed adds materially to the effectiveness of the entire cycle. There

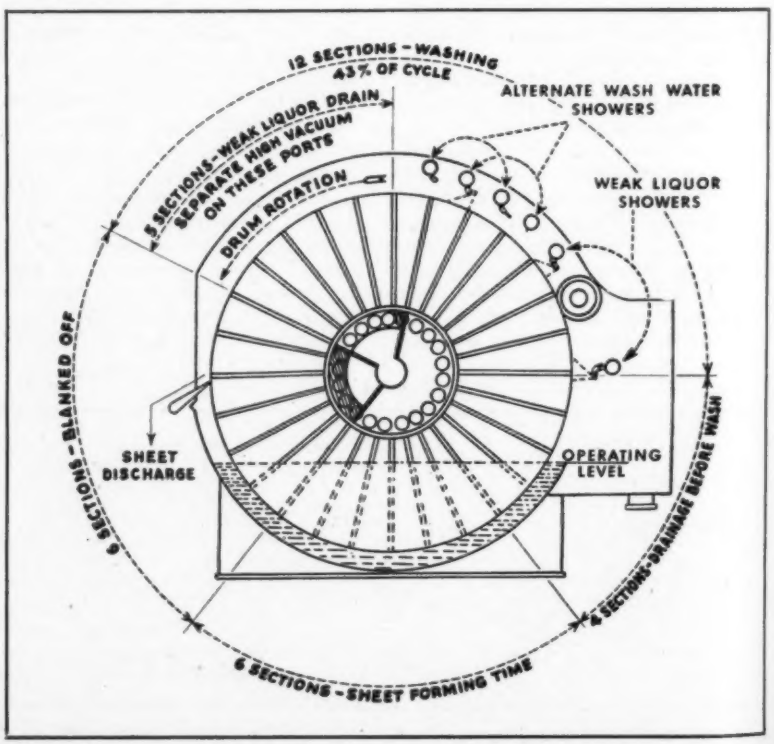

12 SECTIONS - WASHING
43% OF CYCLE
ALTERNATE WASH WATER SHOWERS
3 SECTIONS - WEAK LIQUOR DRAIN
SEPARATE HIGH VACUUM ON THESE PORTS
DRUM ROTATION
WEAK LIQUOR SHOWERS
SHEET DISCHARGE
OPERATING LEVEL
6 SECTIONS - BLANKED OFF
6 SECTIONS - DRAINAGE BEFORE WASH
6 SECTIONS - SHEET FORMING TIME

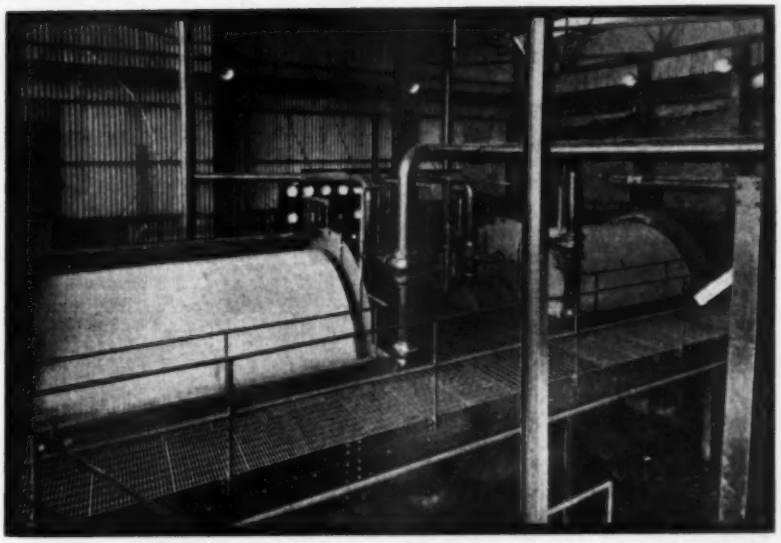
Diagram showing typical operating cycle on two-stage drum

is undoubtedly an optimum sheet thickness on each drum which gives the best displacement and maximum liquor removal. Care must be taken to apply the liquor showers in such a manner that the sheet is not disturbed with resulting channeling of the liquor through the mat. Efficiency is reduced by the presence of blind spots on the drums, because these lead to reduced vacuum, excessive air and foam in the liquor, poor drainage, and a resulting lower consistency in the mat leaving the drum.

Important variables influencing the efficiency of any washing system are found in the pulp itself. The hardness as expressed by the TAPPI permanganate or related tests is only one measure of the washing characteristic of the fiber. The shape and length of the individual fibers as well as the ability of the fiber to retain so-called "bonded soda" have a great influence. The quantity of rejects blown with the pulp also reflects in the total chemical loss and water requirement of the system. A knowledge of the foaming characteristics of the liquor is important in the design of the tanks for a washing system.

Whether or not a vacuum pump is used, there is a large volume of air which mixes with liquor passing down the barometric legs. When this air is released from the liquor, the quantity and quality of the foam produced are functions of the soap content, the liquor concentration, and the design of the liquor tank. The liquor must be free of air before it is reused for repulping operations or shower liquor. It is also important for highest efficiency to handle the foam at the point where it is formed without mixing in a common foam tank.

Without question, it is desirable to use the hottest possible water for washing the pulp. The maximum temperature is determined by the allowable temperature of the liquor leaving the system. When this approaches a point that leads to low vacuum (below 5 inches) and prevents good sheet formation, usually on the first drum, the use of hotter water is not desirable.



Two-stage installation in large southern mill. This installation is now being converted into a two-drum four-stage system

The trend today in all mills is toward the use of more stages in the washing operation. Efficiencies of operation are expected which were not even apparent a few years ago. A fundamental requirement for any washing system today is that it operate as a closed system. It must be simple to control and be capable of producing a uniformly clean pulp at all times. Modern mills are thinking in terms of total losses of 20 to 50 pounds of soda per ton from the washer room.

Recently, a very successful pulp washing system has been placed in operation in one of the largest Southern mills. This is a 3-drum, 5-stage installation. The ability to operate in a closed manner without sewer loss was an important consideration in the design. Complete data from the operation cannot be published at this time, but it can be mentioned that pulp of a TAPPI hardness of 31 is being washed to below 40 pounds of sodium sulphate per ton. The only loss from the system is in the washed pulp. The dilution factor at a tonnage rating of over 200 tons per line of washers is less than 1.8 pounds of water per pound of A.D. pulp. In this particular case the blow liquor concentration was 21.1 per cent total solids with a liquor of 16.8 per cent total solids leaving the system. Under these conditions the so-called "Baumé drop" was 2.86, which is exceptionally low for such pulp. More complete data on this particular operation will be published within a very short period.

It is apparent that the procedures for washing pulp have rapidly developed from an art—in the case of diffuser—to an exact science when using vacuum washers. Modern washers are potentially more efficient and much less difficult to control. The use of the "dilution" concept in analyzing washer room operation has provided an exact factor for comparing results of various installations. The old "Baumé differential" method is misleading.

The economy of a vacuum washing system is generally increased by the use of additional stages. Depending upon related conditions, some value may be obtained from the repulping operation. The attainment of high consistencies in the pulp mat between stages is a vital requirement. Proper sheet formation, large drainage area, even application of a vacuum through the use of a vacuum pump, proper shower application and high wash water temperatures are all factors contributing to maximum efficiency. The intrinsic characteristics of the pulp are important factors.

TABLE 2

Case	1	2	3
Blow Conditions %TS	21	21	21
% BD cons.	9.0	10.5	12.0
Total pulp blown #BD	1,800	1,800	1,800
Total wt. blown #/AD ton	20,000	17,150	15,000
Total liquor blown	18,200	15,350	13,200
Total solids blown	3,810	3,240	2,780
Total water blown	14,390	12,110	10,420
Dilution factor	2.3	2.3	2.3
Total dilution	4,600	4,600	4,600
Total water in liquor from system	18,990	16,710	15,020
Total solids in washed pulp	50	50	50
Total solids recovery	3,760	3,190	2,730
Total liquor recovery	22,750	19,900	17,750
Per cent total solids	16.5	16.0	15.4
°Bé at 60 deg. Fahr.	11.0	10.6	10.2
Baumé differential	3.0	3.4	3.8

The Cigarette Paper Industry*

LEO ROBERTS, Consulting Chemist
(Formerly Chief Chemist of Peter J. Schweitzer, Inc.)

▶▶▶ AN IDEA OF THE magnitude of the cigarette paper industry may be obtained from the following quotation from the *Tobacco Record* of March 13, 1945:

"Cigarette manufacturers aim at sales of 400 billion annually—this would be a gain of 70 billion over the present level of 66 a day for every resident in the U. S. A. In 1945, cigarette sales were 332 billion. The Armed Forces were consuming 11,600,000,000 cigarettes monthly at its peak. Nineteen forty-six shows a big increase thus far and every indication is that these figures will continue to mount to astronomical heights. In addition to the finished product, cigarette papers and tubes swelled internal revenue collections to the amount of $2,253,380.85 in 1945 as compared to $1,205,114.72 in 1944."

From these figures, although they do not pertain directly to cigarette paper, it is evident that cigarette paper manufacturing is a large industry. Its inception into the large industry class started at the beginning of World War II. Before the war, the industry in this country was quite small. Now, most of the paper used is produced here, and American cigarette paper from domestically grown materials is used by most all of the large companies. Even at this date, there are only two or three large manufacturers and the supply does not meet the demand. (Export fields have opened up. Since the French supply is nil, the field is open.) The Ecusta Paper Company, the largest in the industry today, began operations in 1940. The timing of this opening was due to perfect planning of its management and came just when the European supply was cut off.

Just what is cigarette paper? It may be defined as a lightweight, fine tissue that is used as an outside wrapper for tobacco, the paper having certain definite characteristics as to burning qualities.

Contrary to popular belief that there is only one type of cigarette paper, there are actually quite a large number of types. The two basic ones are the *Verge* watermarked paper and *Velin* marked paper.

The Verge mark is characterized by a series of horizontal lines close together and a single vertical line spaced about one-half inch apart. The Velin mark is a series of small squares (about one-half mm.) and barely noticeable. It appears at times like a wire mark.

(*) Abstract of a lecture given before the class in Pulp and Paper Technology at the Polytechnic Institute of Brooklyn on March 23, 1946.)

In this country, the popular paper is Verge. In foreign countries and Latin America, the Velin paper is preferred.

The basic types are produced in various grades of combustible, semicombustible, nitrated, sweeten-nitrated, waterproof, colored, and uncolored papers.

The differences between combustible and semicombustible paper are interesting.

The combustible paper, as the name implies, is one that will keep burning. This feature is desired by American cigarette manufacturers. As long as the cigarette is lit, the paper and tobacco will keep burning unless manually stopped. This paper, therefore, insures a continuous smoke without relighting.

The semicombustible paper requires a smoker to keep puffing if a lighted cigarette is to be kept burning. If such a cigarette is thrown away or carelessly put down, it will go out. This type of cigarette is called for in places where a carelessly thrown cigarette may ignite surrounding materials and cause great damage, such as in cane fields.

Before the advent of World War II, practically all of the cigarette paper used in this country was imported from Europe. France was the accepted center of the industry. The "know how" and the quality standards for paper were set and accepted as related to the French product. There was only a few small mills in this country and their output was sold to the smaller purchasers.

The chief fibrous raw material was rag—mainly linen in the form of old linen rags imported from foreign countries. The use of such rag fiber is not purely a matter of choice. It has been found to be the best for the purpose.

Wood pulp has never been adapted successfully to cigarette paper manufacture because of the large amount of filler necessary for good burning qualities. Samples of wood pulp cigarette paper, when tested, show a serious defect in the burning quality. One of the reasons for this defect in burning quality is that the hydrating qualities of wood pulp are sacrificed to get the desired whiteness. Since filler retention is related to hydration, it is obvious why such fiber has not been adapted for this use.

In the latter part of 1940, when it was evident that imports of linen rags would be cut off from this country, cigarette paper manufacturers began looking around for a domestic source of fibrous raw material which could be used as a suitable substitute. Of the various materials examined, flax waste and flax tow appeared to be the cheapest and most plentiful. However, up to that time, no process was available for pulping this tow. Numerous research groups had been working on the problem but no satisfactory process had been developed.

The problem was difficult since both pectocellulose and lignocellulose were present in the flax. Any practical method of pulping would have to be suitable for both of these types of cellulose.

Research work was started and the project pushed, since the answer had to be obtained in as short a time as possible. After about four months of continuous laboratory work, a procedure was evolved that promised to be the answer. Then pilot plant work was started to work out the numerous peculiarities and to correlate results to mill scale operation.

By the end of the year, mill scale cooks were made and evaluated, and problems of bleaching were worked out. By the beginning of 1941, cigarette paper was being made from domestically grown flax. The quality of this paper proved to be as good as the standards so it was quite evident that flax cigarette paper was here to stay.

Stock Preparation

Before the use of flax, as previously stated, linen rags were used as the source of fiber for cigarette paper. Such rags were cooked with lime to remove impurities. Since the rags were a textile product, they had already undergone chemical treatment. In most cases they were quite pure. Therefore, the use of caustic as a cooking medium was avoided because of its drastic action on the fibers. The lime cook was sufficient to remove the dirt and the resultant half stock was ready for bleaching.

The rags, after cooking, were washed to remove excess lime and dirt. Then they were treated with predetermined quantities of calcium hypochlorite, the batches being circulated for a definite period of time or until the stock was of the required color. Next, the bleach was washed out of the stock and the stuff dumped into drainers where the water drained out. The resulting stock

was then loaded into beaters, beaten and made into paper.

The use of flax fiber put the problem of cooking on a more scientific basis. Research had shown that control was a very important factor in the manufacture of uniform stock.

Flax as received for pulping is a green material. It has never received chemical treatment. It has been mechanically handled to break up and remove as much of the woody material as possible. However, such handling does not remove all of it.

The removal of all woody material is a necessity. If it is not taken out, it appears as brown spots in the finished paper. Therefore, conditions were so set, to remove as much woody material as possible without degrading the residual fiber.

According to procedures evolved in months of research, taking a single cook as an example, the flax is loaded into a rotary digester of 14 to 18 ft. in diameter. The cooking liquor, consisting of caustic soda (16-20 per cent based on the weight of the fiber) and sulphur mixed together in premixing tanks, is next pumped into the rotary. Then, a definite quantity of water is added and the digester closed. After closing the rotary, live steam is introduced and the charge rotated for a period of 6-10 hours.

For cooking flax, a temperature below 300 Fahr. is unsuitable, therefore, a somewhat higher temperature is always used.

After the cooking cycle is completed, the rotary digester is stopped, the excess pressure relieved, and the liquor drained. The black liquor furnishes a good indication as to the extent of cooking.

A sample of the black liquor is sent to the control laboratory for testing for alkalinity, free NaOH, free sulphide, dilution and solids. From experience, each analysis denotes a definite cooking reaction. Test results are filed for comparison with stock quality.

The stock in the rotary is dropped into washers and washed to remove salts and excess chemical. It then is sampled and tested for bleachability, quantity of shives or woody material and viscosity.

Viscosity tests are a necessity as a measure of degradation. Mechanical treatment does not degrade cellulose as much as chemical treatment. Therefore, the degradation of the stock in cooking and bleaching must be rigidly controlled. This control of viscosity lends the stock readily to further treatment and formation of good paper.

Calcium hypochlorite was used first for bleaching flax pulp. The bleaching operation involved in the use of this liquor is not easily controlled. It usually degrades the cellulose excessively. In fact, viscosity measurements have shown degradation beyond the range necessary to reach the desired whiteness. Sodium hypochorite then was substituted for calcium hypochlorite. This bleaching agent, as received, is excessively alkaline. Therefore, in order to bleach efficiently *p*H control is very necessary.

Sodium hypochlorite bleaching was discarded because of its slowness. The bleaching currently used is similar to kraft bleaching, i.e., multistage chlorine bleaching.

In this procedure, the washed stock is acidified. Then chlorine gas is fed into the mixture to the desired concentration to develop the required degradation as previously determined by testing the unbleached stock.

After chlorination, the stock may be washed with water or a caustic wash may be used. The caustic removes the chlorination products.

A third alternate is direct formation of sodium hypochlorite in the washer by the addition of caustic and chlorine. This third procedure although using more chlorine, since water removable materials are chlorinated, will bleach in a shorter time.

The washed bleached stock (of the desired viscosity) is dropped into drainers or into stock chests. The use of drainers has been somewhat discontinued in favor of the stock chests from which the stock is pumped directly to the beaters.

The secret of good cigarette paper lies in a large degree in proper stock preparation and in beating. The beaters generally used are of 1000 lb. capacity.

At the end of the beating cycle, before the beaters are dropped, calcium carbonate is added to the stock. (Present-day trends have changed the addition of filler at this time because of the advantages of adding the filler in slurry form.) The stock then is jordanned. After jordanning, it is passed through equipment to remove foreign dirt and any woody material that may have withstood the several chemical treatments.

Cleanliness, or the removal of foreign particles, is a necesssity in the making of good paper. Quality paper is pure white with no specks or spots of any kind. Among the most common foreign particles found in stock are woody shive, carbon, iron, brass, rubber, and less frequently others.

The machine used to fabricate the paper is the fourdrinier. The width of wire may vary from 90 to 125 inches and the dandy or watermarking device may vary in size up to 30 inches.

Attempts to mark the sheet at the press roll have not been very successful.

The suction couch has proven itself and is used widely in the industry.

Machine speeds may vary from 125 ft. to 350 ft. per minute. The dryer section generally consists of six steam heated rolls.

Some years back, certain properties, normally missing from regular paper, had to be imparted to the sheet. Research showed that the answer was in the addition of certain chemicals to the paper. Addition by impregnation of the dry paper would entail an added operation. Added operations are expensive. To do the job economically, a change was made in the paper machine. Midway between the six dryers, an extra press roll section was added. The paper from the third dryer was routed over a guide roll and then through the press. The lower press roll carried the impregnating chemical from a large pan set under it and delivered it to the paper. The impregnated sheet continued in its travel over the remaining dryers and the drying completed. This procedure worked very satisfactorily.

The jumbo rolls produced by the machine are rewound and slit to the specifications desired. Some of the paper is cut to size desired by the customer, but most of it is cut into bobbins. Bobbin paper is 29 or 30 mm. wide and is wound on a core to a length of 4,000 or 6,000 meters. The standard bobbin runs 6,000 meters.

This paper is correct in size for the formation of cigarettes. The ribbon of paper is wound around a continuous circle of tobacco, the edges are glued together and the continuous ribbon cut mechanically to the desired length.

Calculations show that 80,000 cigarettes can be made from one bobbin of 6,000 meters.

After the slitting, the paper is inspected for defects. Any paper not passing inspection is checked for the reason of rejection and proper authorities notified. As a result, changes are made to eliminate the trouble.

Paper Testing

Quality control is necessary 24 hours a day to maintain specifications. Samples are tested for physical quality in a temperature and humidity controlled room. Besides the usual tests for weight, thickness, Mullen, fold, tensile, opacity and whiteness, the paper is tested for textures, pinholes, spots, porosity, filler, per cent chemical, wet strength, and burn. The latter series of tests are very important as indications of the quality of the paper as cigarette paper.

Variations in tests are reported to

the machine supervisor. He then is in position to order adjustments made to maintain the qualities required.

Texture and spots tests include the determination of clarity of watermark, uniformity of the sheet, and type and quantity of foreign particles. The appearance of the paper, indicated by these factors, is rated as very important.

Porosity is measured as a factor of the burning qualities. Uniform burning depends upon keeping a close check upon a narrow range of porosity. The presence of pinholes has been found to be detrimental. To a large extent, the amount of filler controls the porosity, and in addition, contributes to the whiteness of the paper.

In order to control chemical additions, the percentage of chemical in the paper is checked. Additions for bettering the burn must be rigidly controlled. Too much or too little chemical will obviate the advantages gained by its use. Wet strength qualities are evaluated by empirical methods—plunger type testers are usually used.

The burn test is usually carried out by manually rolling cigarettes, using the paper to be tested on the customer's own type of tobacco. This test includes evaluation for appearance of ash, ring and burning time.

Cigarette Paper Problems

Cigarette paper, like many other papers, has its own use requirements. Since its success or failure depends upon the burning characteristics, the importance of the property of burn cannot be overemphasized. The burning qualities that are evaluated are: burning time, type of ring on the burning edge, and type and quantity of ash.

The burning time is more or less dependent upon the type of fiber, porosity, filler and impurities. At one time, pentosan content was presumed to be important. Further testing, however, ruled out its effect as inconclusive.

The ring of the burning paper may be due to the effect of added chemical. If there is an excess of chemical, the ring may be wide, black and irregular; while if it should be thin, narrow and sharply straight.

The type and quantity of ash is a factor that is controllable.

Research projects on ash control have involved time consuming tests with numerous types and quantities of chemical raw materials. Some chemicals act as fireproofing agents and the smallest quantity will cause the ring to be wide and black. Other chemicals react as combustion accelerators and the paper burns too rapidly. Certain chemicals in definite quantities cause the ash to lay down and the paper to burn more evenly. The perfect ash should be white, nonflaky and of good appearance.

Without these chemicals, flax paper has a tendency to curl outward, and the flakes of paper ash do not stick to the ash of the tobacco. This nonsticking ash flakes out over the person smoking the cigarette. It is a definite nuisance to the fastidious person. A recent patent aiming at the control of the burnt ash involves the use of salt and borax in certain concentrations.

About two years ago, a patent was issued involving the use of glass fiber in cigarette paper. Several years before the issuance of this patent, the author experimented with glass fiber and found its effect quite interesting.

The addition of glass fiber to the paper furnish gives a burning quality to the paper like the ash on a good cigar. The glass fibers form a skeleton network around the ash and thus hold it intact. In fact, actual tests have shown that considerable effort is necessary to remove it.

The use of glass fiber, however, will depend upon the psychological effect of its use on the public mind. The mere mention of glass in paper may arouse antipathy, though unjustifiably so.

South American consumers of cigarettes have expressed a definite desire for sweetened paper. This sweetening is accomplished by the use of saccharin.

Paper for the Latin American trade is also treated chemically by impregnating it with nitrates—either sodium or potassium. Cigarettes made with such paper burn faster than do cigarettes made from paper without it. At the same time, the ash clings and does not flake off.

The desire to put wet strength in cigarette paper came about comparatively recently because of complaints of smokers who wet the ends of cigarettes. Regular paper has very slight wet strength, so in the mouths of such smokers it cracks and the tobacco strings out.

The first approach to the problem was made by using regenerated cellulose. This addition did impart a certain amount of wet strength. Likewise, the author, after considerable research, developed a method that was successfully used. More recently, experiments have been conducted with the melamines and urea formaldehydes. In each case, they produced paper which upon burning produced an irritating odor and had to be discarded. A resin that would produce wet strength and would not bring forth an objectionable odor on burning would definitely be an asset to the industry.

The waterproof cigarette, though still not widely popularized, is a forward step. The paper for such a cigarette sheds water like a duck's back. A striking demonstration can be made by placing a waterproof and a nonwaterproof cigarette under a light stream of water. The waterproof cigarette will not wet; the other will soak and fold up in no time.

Waterproof paper was patented as far back as 1934, yet it still has a drawback. The resins used for its production produce a definite, characteristic odor upon burning. A recent patent using aluminum stearate is the newest development in this line. This material, while usable, adversely affects burning qualities.

Fillers in the paper have also been a problem of research. The filler most commonly used is calcium carbonate. While it does impart to the paper good porosity, it does not do too well as far as opacity is concerned. The use of titanium dioxide, on the other hand, while imparting opacity, does not give porosity.

At one time, cigarette manufacturers were approached with the idea of using titanium dioxide; they demurred. Somewhere in the literature, it had been reported that TiO_2 was toxic.

The use of diatomaceous earth has been tried. It was discontinued because of its abrasive effect.

The odor of burning paper is definitely not agreeable. The products of burning cellulose include ethylene, carbon monoxide, methyl alcohol and acetic acid. The products of burning tobacco, according to the literature, are still more undesirable.

Attempts are being made to eliminate or modify these odors by means of chemical additives. Thus far, the attempts have not been very successful.

Future: Cigarette Paper

It is the author's opinion that the future cigarette paper will be of the waterproof type. This paper will become extremely popular if its disadvantages can be overcome.

Chemical treatment will be used to modify the burning paper scent and give a pleasant tobacco-like odor.

Fillers, such as glass fiber, will be added to the paper so that the ash will not flake off.

The cigarette paper industry is still a growing industry. So far, the demand for paper is greater than the supply. At present, with no foreign competition to speak of, the market for cigarette paper is world-wide.

". . . high vacuums are being achieved through numerous advancements in vacuum producing equipment, and, not in the least, as a result of new and improved measuring and controlling means."

Measuring High Vacuums with the Thermal and Ionization Gauge

J. GORDON SEITER
The George E. Fredericks Company

▶▶▶ A FEW YEARS AGO, an absolute pressure of a few millimeters of mercury was considered a comparatively high vacuum. With a few exceptions, high vacuum techniques generally were confined to the laboratory. Today, absolute pressures in the low micron range are becoming commonplace in industry and are making practical many processes formerly difficult or impossible to carry out at higher pressures. These high vacuums are being achieved through numerous advancements in vacuum producing equipment, and, not in the least, as a result of new and improved measuring and controlling means.

Scope of the High Vacuum Field

Some processes to which high vacuums are now being applied include:

1) Evaporation of metals and metallic salts, as in the manufacture of magnesium, and surface plating of optical lenses and mirrors, and the metallic plating of cellulose sheets
2) Drying blood plasma, penicillin, and other biologicals through sublimation
3) Evacuation of electronic tubes
4) Distillation of vitamin oils, essential oils, and aromatics
5) Extraction of foods and drugs and the recovery of volatile solvents
6) Impregnation of coils, condensers, armature windings, textiles, and wood.
7) Low temperature drying of foods and chemicals

Need for Accurate Measurement and Recording

Continuous measurement of extremely low pressure is indispensable to most of these processes because of one or more of the following reasons:

1) Some processes become inoperative when the pressure is too high or too low. In electronic drying, for example, arcing will occur if the pressure within the evacuated system is not held above a minimum critical value.

2) Increased yield and a greater pumping economy result where the process is controlled from a direct measurement of pressure. Without the benefits of this type of system, the pumps must be controlled on a timed basis and inefficiencies result since broad allowances must be made to make certain that the desired vacuum will be attained within the allotted time.

3) Damage to products is reduced when leaks or inefficiencies in the vacuum equipment are made known immediately to the operator. Alarm signals can be incorporated in the vacuum recorder to provide positive warning when the vacuum begins to fall off.

Fig. 1—Primary detecting element of Televac Thermal Gauge

Principles of Measurement

The thermal gauge is used in many processes to measure pressures ranging from 0.5 millimeter (500 microns) down to 0.001 millimeter (1 micron) of mercury pressure absolute.

For processes employing ultra-vacuums, that is, absolute pressures ranging from one micron down to one-thousandth of a micron of mercury pressure absolute, the ionization gauge is used. By coupling these gauges with a Brown ElectroniK potentiometer, accurate indication, recording, and controlling of pressures at any point between 500 microns and 0.001 micron are obtainable.

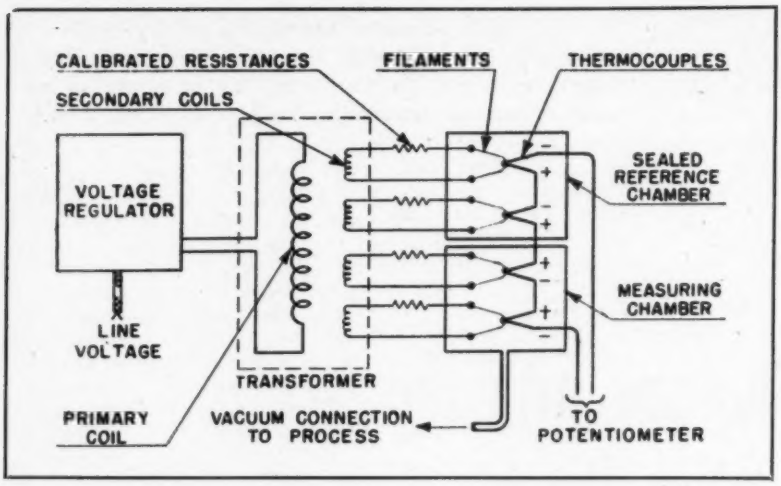


Fig. 2—Schematic diagram of Televac Thermal Gauge

The operating principles employed in the thermal and ionization gauges are to be contrasted with the mercury manometer and Bourdon tube type vacuum gauges which have been used for years. The mechanics of these latter gauges seriously limit their use to the continuous measurement of high and ultravacuums. The operating principles of the thermal and ionization gauges are electrical and electronic—no mechanical limitations are imposed upon their operation.

Televac Thermal Gauge: The ability of residual gas in an evacuated system to conduct heat away from a hot filament is the basic principle of the Televac thermal gauge, illustrated in Figure 1. At pressures between that of the atmosphere (760 millimeters = 760,000 microns) and 1,000 microns of mercury pressure absolute, there is very little change in the filament heat loss with changes in pressure. Below 1,000 microns and especially below 500 microns, the changes in heat loss with changes in pressure are relatively large. The relationship between filament heat loss and absolute pressure is definite and serves as a reliable and accurate basis for pressure measurement. As the vacuum surrounding the filament becomes greater, the filament grows hotter. On the other hand, as the vacuum falls off, the filament grows cooler.

The Televac thermal gauge is illustrated schematically in Figure 2. The filament is heated continuously and uniformly by an electric current of constant voltage. Line current is passed through a voltage regulator and then to the primary coil of a transformer. Four secondary coils of the transformer each supply current to four separate filaments. The current to each filament is held constant by means of carefully adjusted resistance coils in series with the transformer secondary coils.

There are two filaments in the measuring chamber of the gauge and two filaments in a sealed reference chamber. The reference chamber is sealed at a pressure of one micron of mercury at the factory and remains unaltered during the life of the gauge. A small, sensitive thermocouple is incorporated on each filament to measure the filament temperature. Note from Figure 2 that the two thermocouples in each chamber are connected in series to provide a greater emf. Also note from Figure 2 that the four thermocouples in the measuring circuit are electrically connected so that the emf from one set of couples (reference chamber) tends to cancel the emf from the other set of couples (measuring chamber), leaving only the residual to be detected which is, of course, a measure of the difference in pressure between the sealed reference chamber and the measuring chamber.

Fig. 3—Primary detecting element of Televac Ionization Gauge

The emf from the gauge which varies from zero millivolts at one micron pressure up to approximately 19.2 millivolts at a pressure of 500 microns of mercury is measured and recorded by a Brown ElectroniK potentiometer.

Televac Ionization Gauge: The ability of electrons emitted from a hot filament to bombard the molecules of residual gas in an evacuated system is the basic principle of the Televac ionization gauge, illustrated in Figure 3. The flow of ions formed through ionization of the residual gas is a direct measure of the amount of gas present and hence the absolute pressure or vacuum, providing, of course, that the electron stream is constant. A special bridge circuit which fulfills this condition is incorporated in the Televac (Model S).

Essentially, the gauge is a triode tube, comprising filament, grid, and plate. Electrons emitted from the filament are accelerated to the grid and would be carried on to the plate by their own momentum were there not an inverse field impressed between the grid and plate to prevent this. Therefore, the electrons return to the grid and are collected on it. It is in this passage between the grid and plate that the electrons bombard the gas molecules, thus forming ions. These ions are collected on the plate and, after preamplification, the ion current is measured by a Brown ElectroniK potentiometer.

Design Features: Several of the problems usually associated with ionization gauges have been solved in the Televac design. These problems include: (1) electrical leakage, (2) burning out of filaments, (3) outgassing, and (4) changing or drifting calibration.

Although a potential of 700 volts is applied to the grid, electrical leakage is overcome by bringing the leads out opposite ends of the tube, as contrasted to conventional practice.

Filament burnout, which would result if the ionization gauge were turned on at a pressure above one micron of mercury, is eliminated by a unique safety feature. Since the ionization gauge is always used in combination with a thermal gauge, the latter gauge is used as a safety switch, permitting the ionization gauge to be turned on only after the pressure in the system has been reduced to one micron of mercury. This feature eliminates costly process shutdowns and

tube replacements when sudden increases in process pressure occur. Success of the design is proven by the fact that many ionization gauges have been in active service for over 2,000 hours and are still functioning perfectly. This gauge can be used only with the Model S Televac, which houses the electronic safety circuit. This feature eliminates the need for skilled technicians since the gauge circuit cannot be harmed or "burned out" by inexperienced operators.

Outgassing, that is, removal of residual gases from the tube and its components of the Televac ionization gauge, is required but once—the first time it is used. Most conventional ionization gauges require outgassing each time they are placed in operation. The requirements for outgassing are eliminated in the Televac tube by the large amount of heat dissipated by the tube filament. This heat is sufficient to cause the tube to outgas itself and thus eliminate an inconvenience which normally would be required to obtain an accurate vacuum reading.

The calibration of the ionization gauge is not affected by age in that the increased resistance of the filament due to decrease in size and electron loss is compensated electronically.

ElectroniK Potentiometer Recorder

The strip chart ElectroniK potentiometer used with the Televac thermal and ionization gauges is illustrated in Figure 4. In this view, a laboratory technician is shown standardizing the gauges against a laboratory type McLeod gauge. Once the gauges are standardized, they require no further calibration throughout their life. A fast speed potentiometer with full scale pen travel in 12 seconds is employed to continuously follow all changes in pressure. The chart has a a calibrated width of eleven inches.

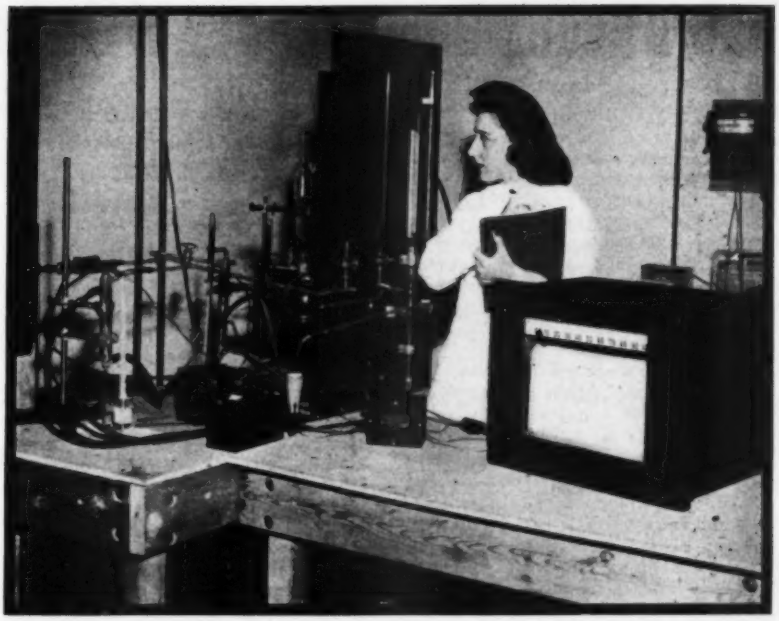


Fig. 4—Laboratory technician standardizing ElectroniK recording high vacuum gauge

Continuous records of high vacuum production cycles are invaluable to many processes as, for example, in the manufacture of first surface mirrors. These mirrors are manufactured by coating the glass surface with finely divided metal particles. Aluminum or magnesium vapor is deposited on the glass surface under a very high vacuum.

A record of this process is illustrated in Figure 5. The record on the lower section of the chart is made by the thermal gauge. This record traces the vacuum as it is increased, first by means of the fore pumps and then the diffusion pumps. Note the temporary loss of vacuum due to the outgassing of the diffusion pump oil and later the temporary loss due to outgassing caused by bombardment of the glass surface with a high frequency charge. (This electrical charge cleans the surface of the glass just before the metal coating is applied.) After this bombardment, the vacuum again increases to the point (one micron pressure) at which the ionization gauge is turned on. The instrument pen quickly moves across scale and a record of the increasing vacuum continues, within a new range, namely: 0.4 to 0.001 micron. Note the loss in vacuum due to the first evaporation of metal, a regain in the vacuum, and then a second loss due to the second evaporation of metal. The process is completed when this last vacuum loss is recovered.

The chart shows the operator when to turn on the diffusion pumps; when to start bombarding the glass; and when to evaporate the metal, thus eliminating guess work entirely. Numerous other processes have proved the value of continuously and automatically measuring and recording high vacuums.

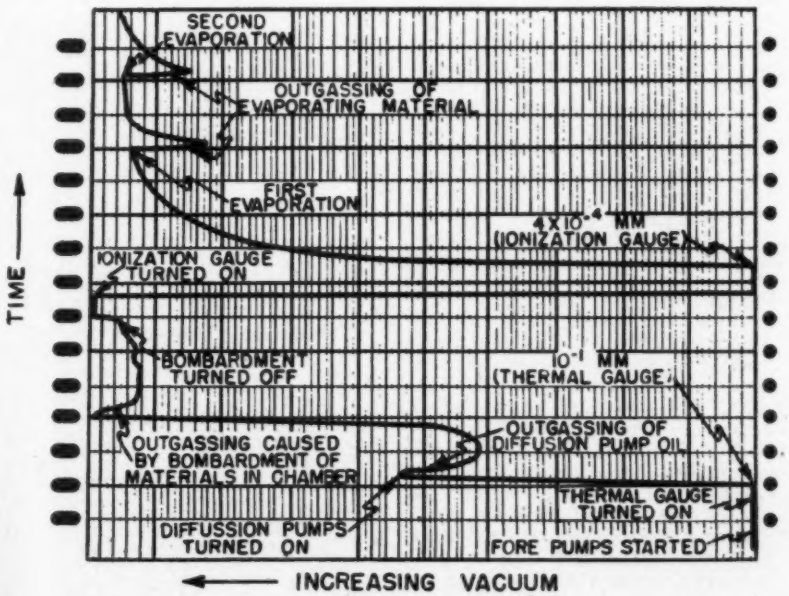


Fig. 5—Chart from ElectroniK recorder showing steps in manufacture of first surface mirrors

Extraneous Components of American Pulpwoods

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▶▶▶ ALL WOODS CONTAIN three types of organic cell wall components: cellulose, lignin, and the hemicelluloses. In general, these components are insoluble in water and in neutral organic solvents. Besides these, every wood contains varying amounts of organic compounds that may be extracted with neutral solvents. For example, the larches contain appreciable amounts of water-soluble substances. Redwood frequently contains a large amount of alcohol-soluble material. The pines are often rich in ether-soluble resin. Port Orford cedar yields an appreciable amount of essential oil, volatile with steam. Many species of oak contain starch.

These substances are frequently termed "extraneous components." They are also referred to as "extractives." In general, these substances are not part of the cell wall itself (although borderline cases admittedly exist).

An extraneous component of wood may be defined as a substance that can be removed by extraction with a neutral solvent (and/or by distillation with steam) or which, on microscopic examination of the wood, appears to be distinct from the cell wall (e.g., calcium oxalate crystals, starch grains, etc.)

These extraneous substances characterize the wood. Thus, its durability (its resistance to insect or fungal attack), color, odor, taste, toxicity, and even certain of its physical properties, such as ultraviolet fluorescence, are correlated with the presence or absence of these extraneous components. There are many classes of such components, and probably no one species contains representatives of all classes.

Often these extractable substances play a role, the importance of which is out of all proportion to the amounts present. Thus, relatively small amounts of a dihydric phenol (pinosylvin) prevent the successful sulphite digestion of pine heartwood. They also prevent decay in old pine stumps. Furthermore, a number of these extraneous components, such as resin acids, fats, terpenes, sterols, natural dyestuffs, and tannins, may be valuable commercially.

The following report gives a summary of the results of a literature survey on these extraneous components. Data dealing with certain exudates (like the oleoresins) of the living tree are included, because these, too, are important industrially. The survey includes information from Wehmer's *Die Pflanzenstoffe (114)*, a thorough search of *Chemical Abstracts* from 1932 to 1945, inclusive, and reference to the original articles when available.

SOFTWOODS

Cedar, Western Red (*Thuja plicata*)

Solubility, per cent:

Hot water, 11.0; ether, 2.5; alcohol-benzene, 14.1 *(41)*.

Water (60°), 7.33; followed by ether, 0.31; and alcohol, 2.56; total 10.2 *(53)*.

Steam distillation gave 0.03-0. 30% of dehydroperillic acid, $C_{10}H_{12}O_2$, m. p. 88°; the methyl ester b_{14} 112-113°, m. p. 34.5-35.0°, d_4^{22} 1.0225, n_D^{22} 1.5130. Heating with 3% hydrochloric acid gives cumic acid. Catalytic reduction gave $C_{10}H_{18}O_2$, b_{18} 150-152°, d_4^{25} 0.9925, n_D^{25} 1.4670, which is believed to be the liquid isomer of hexahydrocumic acid. Hydrolysis of the ozonide gave formaldehyde, formic acid, acetaldehyde, acetic acid, oxalic acid, carbon dioxide, and probably β, γ-diketo valeric acid. A second compound, $C_{10}H_{12}O_2$ (tentative) m. p. 82°, which is very toxic to *Fomes annosus*, has also been isolated *(4)*.

Douglas Fir (*Pseudotsuga taxifolia*)

Solubility, per cent:

	(5)	*(21, 24)*
Hot water	7.80	2.0—6.6
Ether		0.3—2.6
Alcohol-benzene	7.20	1.5—5.7

(25) *(41)*

	Sap	Heart	
Hot water	5.0	4.2	5.0—6.5
Ether	0.4	1.0	0.4—1.3
Alcohol-benzene	1.6	3.3	3.7—4.3

(89)

	Heart	
	Spring	Summer
Hot water	4.67	3.76
Cold water	3.00	2.15

Successive extractions: with ether, 1.05; alcohol, 3.81; water, 1.04; total, 5.9 *(53)*.

Oleoresin: "Oregon balsam" collected from accumulations in natural cavities of the living tree gave 26-38% volatile oil (levorotatory), which contained roughly equal amounts of l-α-pinene and β-pinene. The resin acid is probably related to abietic acid *(8)*. The oleoresin from pockets in heartwood gave about 30% of a volatile oil containing 60% l-α-pinene, about 5% limonene, and l-α-terpineol, but no camphene or β-pinene *(101)*. The oleoresin from scarified trees yielded 22.7% of a volatile oil containing 17% l-α-pinene, 46% l-β-pinene, and probably l-limonene *(101)*. One sample had the following properties: d^{20} 0.9821, n^{20} 1.5175, $[\alpha]_D$ —8.82° *(42)*.

The volatile oil from the wood has d^{20} 0.8621, n^{20} 1.4730, $[\alpha]_D$ —47.2° *(42)*. Another sample of the volatile oil from the wood (isolated in 3.3% yield) contained 30% l-α-pinene, 6% l-camphene, 14% l-limonene, 32% l-α-terpineol, and a small amount of higher-boiling constituents, probably sesquiterpenes; acetic acid was present in a combined state *(57)*.

A water-soluble arabogalactan, small amounts of water-soluble pectic substance, and a mannose-yielding material have been found in the wood *(53)*.

The yield of tannin from sawdust was 1.1% *(9)*.

Conidendrin could not be detected in the sapwood *(36)*.

Fir, Alpine (*Abies lasiocarpa*)

The oleoresin has d^{25} 0.970, n_D^{25} 1.5201, $[\alpha]_D$ 2.62°; the volatile oil amounts to 27.9% on vacuum distillation and 32.6% on steam distillation and contains 40 to 50% of β-pinene and 25% of β-phellandrene; limonene, bornyl acetate, and cadinene are probably present. The nonvolatile matter consists of 23.7% free fatty acids (partly unsaturated), 2% free resin acids, 19.2% esters and glycerides (largely of fatty acids), 20.6% unsaponifiable matter, and 1 % cold water-soluble material.

The resin acids contain abietic and probably pimaric acids *(10)*.

Fir, Balsam (*Abies balsamea*)

Solubility, per cent:

(87)

	Cut in July		Cut in February	
	Sap	Heart	Sap	Heart
Hot water	1.65	3.8	2.9	3.0
Ether	0.95	1.18	0.93	0.74
Alcohol	1.75	4.3	3.3	3.7

Alcohol-benzene + hot water, 4.2 *(71)*.
Alcohol-benzene, 2.42-2.64 *(53)*.

Oleoresin (Canada balsam): d. 0.987-0.994; n_4^{30} 1.52-1.54; $[\alpha]_D^{30}$ 1-4° *(77)*. The volatile oil (26.6%) contains l-α-pinene primarily *(96b)*; it also contains bornyl acetate *(77)*. According to other investigators, the volatile oil contains l-α-pinene, l-β-phellandrene (20%), and l-β-pinene *(108)*.

The oleoresin contains 13% of amorphous canadinic acid, $C_{19}H_{34}O_3$; 48.50% of canadinolic acid, $C_{19}H_{30}O_2$; 0.3% of canadolic acid, $C_{19}H_{28}O_2$, and small amounts of succinic acid *(112, 114,* p. 36*)*.

Distillation of the oleoresin gave 0.6% of a crystallline acid identical with pinabietic acid and not with Tschirch's canadolic acid *(86)*.

Fir, Grand (*Abies grandis*)

Solubility, per cent:

(41)

Hot water	2.3
Ether	0.9
Alcohol-benzene	2.6

Oleoresin: d^{25} 0.966; n_D^{25} 1.5065; $[\alpha]_D^{25}$ 85°; volatile oils, 42.7% *(10)*.

Fir, Noble (*Abies nobilis*)

Conidendrin could not be detected *(36)*.

Fir, Silver (*Abies amabilis*)

Solubility, per cent:

	(19)	*(41)*
Hot water	2.0	3.2—4.4
Ether	0.3	0.9—1.4
Alcohol-benzene	2.0	

The oleoresin contains 40.2% volatile oil, whose chief component is l-pinene, together with some l-limonene (*85*, 114, p. 36).

Fir, White (*Abies concolor*)

Solubility, per cent:

(54)

	Total	Sap	Heart
Cold water	1.12	0.53	1.99
Hot water	1.89	1.41	2.61
Ether	0.23	0.20	0.25
Alcohol-benzene	1.43	0.94	1.67

The oleoresin ("balsam of white fir") yields 27.7% of a turpentine-like volatile oil containing pinene. The resin contains no resin acids *(2)*.

Conidendrin could not be detected *(36)*.

Hemlock, Eastern (*Tsuga canadensis*)

Solubility, per cent:

Hot water, 3.1-3.9; ether, 0.2-1.2; alcohol-benzene, 3.4-4.6 *(41)*.

Conidendrin has been reported *(36)*.

Tannin is absent *(90)*.

Hemlock, Mountain (*Tsuga mertensiana*)

Conidendrin has been reported *(36)*.

Hemlock, Western (*Tsuga heterophylla*)

Solubility, per cent:

	(5)	*(41)*
Hot water	4.75	2.0—4.2
Alcohol-benzene	7.36	1.9—4.1
Ether		0.3—1.3

	(41)		*(66)*	
	Sap	Heart	Sap	Heart
Hot water	2.2	3.5	2.6	5.1
Ether	0.2	0.2	0.5	1.0
Alcohol-benzene	2.1	4.5	2.1	5.8

Successive extractions: ether, 0.73; alcohol, 3.9; water, 0.59; total 5.22% *(53)*. The location of ether, alcohol, and water extractives was determined by means of fluorescence analysis. The relative intensities of the fluorescence of sapwood extracted with various solvents are shown by curves *(73)*.

The native lignin (containing 14.7% methoxyl) has an ultraviolet absorption spectrum identical with that from spruce. The methoxyl contents of the native lignin and its derivatives are the same as those derived from spruce *(16)*.

Conidendrin has been reported *(17, 83)*. The tannin content is 1.0% *(7)*.

Larch, Western (*Larix occidentalis*)

Solubility, per cent:

Cold water, 10.6; hot water, 12.6; ether 0.8 *(41)*.

The oleoresin yields 14.6% of a volatile oil *(96e)*.

The tannin content is 6.7% *(7)*.

Flavones are probably present *(59)*.

The water-soluble polysaccharide (9-18%) is termed arabogalactan, which has $[\alpha]_D^{20}$ 12°; it has the approximate composition $[(C_6H_{10}O_5)(C_6H_{12}O_6)_6]_n$; it yields substantially 84-85% galactose and about 12% arabinose on hydrolysis. Uronic acid is either absent or is present in insignificant amount. The arabogalactan, despite uniform composition, is probably not homogeneous. It forms esters that may be fractionated and a methyl ether. The reducing value is about 35 mg. of cuprous oxide per 500 mg. of polysaccharide *(50, 51, 78, 84, 102, 116, 118, 120)*.

Pine, Jack (*Pinus banksiana*)

Solubility, per cent:

	(25)		*(41)*
	Sap	Heart	
Hot water	1.9	4.3	3.0—6.0
Ether	1.6	5.2	1.9—4.1
Alcohol-benzene	6.5	7.5	3.8—5.6
Alcohol			0.77—1.71

Alcohol-benzene + hot water, 4.8% *(71)*.

Resins from green and seasoned wood have been studied. The extractives from seasoned wood contained less fats and more resin acids. The fatty acids are largely unsaturated. A phytosterol, m. p. 131-132°, was found, together with resenes and polymerized terpenes *(49)*. Pinosylvin monomethyl ether; 2, 3-dihydrochrysin; $C_{15}H_{12}O_5$ (possibly 2, 3-dihydro-3-hydroxychrysin); and arabinose have been reported *(33)*. The same investigator reported pinocembrin, $C_{15}H_{12}O_4$, m. p. 195-196°, $[\alpha]_D^{25}$ −45.5°; it contains no methoxyl; acetylation gave 1, 3, 6-triacetoxychalcone, $C_{21}H_{18}O_7$, m. p. 117-119°; methylation gave the compound $C_{15}H_{11}O_5$(OMe), m. p. 91-92° *(35)*. Pinobanksin, $C_{15}H_{12}O_5$, yellow prisms m. p. 173-175° $[\alpha]_D^{20}$ 1.5°, no methoxyl, was also found *(35)*.

Arabogalactan has been found in the water extractives *(53)*.

Pine, Jeffrey (*Pinus jeffreyi*)

Volatile oils from the oleoresin and from the wood have been examined. They contain about 95% of heptane and 5% of an aldehyde, apparently citronellal *(99)*. Another investigator reported 90-95% heptane *(1)*. The nonheptane fractions have been studied to some extent. The lowest boiling fraction called the aqueous "cohobate," contains propionic acid; an oily fraction, distilling below the boiling point of heptane, contains acetone, alcohol, isobutyraldehyde, and formaldehyde *(109)*. *n*-Octylic, *n*-nonylic, and *n*-decylic aldehydes were identified in fractions boiling higher than heptane *(38)*.

Pine, Loblolly (*Pinus taeda*)

Solubility, per cent:

	(26)	*(41)*
Hot water	3.1	1.8
Ether	2.5	1.9
Alcohol-benzene	3.8	2.7

	(67)		*(75)*
	Stored Wood	Seasoned Chips	
Hot water	..	4.6	..
Ether	1.6	2.6	1.8
Alcohol-benzene	4.1	4.9	2.8

(89)

	Sap		Heart	
	Spr.	Sum.	Spr.	Sum.
Cold water	3.3	2.2	7.5	7.6
Hot water	3.5	3.0	7.2	6.4

Alcohol-benzene extractives, 5.4%; water extractives (after alcohol-benzene), 1.4% *(53)*.

Successive extractions: ether, 2.7; alcohol, 1.14; water, 0.56; total, 4.4% *(53)*. Benzene extractives averaged 2.98% on 68 samples of sapwood over a 10-month period *(11)*.

The location of the ether, alcohol, and water extractives was determined by means of fluorescence analysis. The relative intensities of the fluorescence of pine sapwood extracted with various solvents are shown by curves *(73)*.

Composition of ether extractives from green wood (based on oil): unsaponifiable material, 15.80; rosin acids, 37.20; saturated fatty acids, 2.28; and unsaturated fatty acids, 41.32% *(75)*.

Tannin was not found *(93)*.

Pine, Lodgepole (*Pinus contorta*)

The volatile oil from oleoresin, d^{15} 0.851—0.855, $[\alpha]_D^{20}$ −20.12°, is almost entirely *l*-β-phellandrene *(98)*.

Pine, Longleaf (*Pinus palustris*)

Solubility, per cent:

	(26)	*(41)*
Cold water	..	6.2
Hot water	2.4	2.4—7.2
Ether	2.9	2.1—6.3
Alcohol-benzene	4.3	4.3

	(60)	
	Sap	Heart
Ether	1.43—2.75	3.65—20.30
Alcohol-benzene	2.50—5.52	4.54—19.55

Benzene extractives, 8.81%; alcohol extractives (after benzene), 3.42% *(70)*. These investigators also reported alcohol, 7.4%; ether, 11.8%; and studied chip extraction with alcohol, benzene, ether, and chloroform over a wide range of conditions.

Alcohol-benzene extractives, 5.5%; water extractives (after alcohol-benzene), 1.1% *(53)*.

The oleoresin of longleaf pine has been studied intensively by several investigators because of its industrial importance. Samples collected in successive years were analyzed *(12)*.

	1931	1932
Rosin, %	77.7	79.1
Turpentine, %	19.8	18.1
Water + loss, %	2.5	2.8
d_{15}^{15} of turps	0.8700	0.8689
n_D^{20} of turps	1.4681	1.4705
$[\alpha]_D^{20}$ of turps	13.23°	10.6°

The original oleoresin apparently contains no abietic acid, but contains α- and β-pimaric acids and α- and β-sapinic acids *(80)*. There are about two parts of *l*-β-pimaric acid to one part of *d*-α-pimaric acid present. In the oleoresin, *l*-pimaric acid amounted to 31.2—33.7%, and in the scrape to 38.0—39.9% *(29)*. Dihydroabietic acid was found in the oleoresin and the rosin *(37)*. The volatile oil from the oleoresin, d^{20} 0.8618, $[\alpha]_D$ 7—22°, contains 64.3% *d*-α-pinene and 31.8% β-pinene *(31, 114, p. 20-22)*. It also contains *p*-menthene, dipentene, a terpene alcohol (no fenchol), terpinolene, methyl chavicol, pinocarveol hydrate, bornyl acetate, and phenolic hydroxy compounds in the high boiling fractions *(23)*.

The rosin from the oleoresin contains about 90% of isomeric $C_{20}H_{30}O_2$ acids, *d*-pimaric acid, and abietic acid (the latter presumably formed from *l*-pimaric acid and the sapinic acids originally present), *(80)*. Resenes found in the oleoresin include *n*-heptacosane, $C_{27}H_{56}$, m. p. 60°;

a tricyclic diterpene, $C_{20}H_{32}$, b_{12} 192-195°, n_D^{25} 1.5106, $[\alpha]_D$ 8.4°; a diterpene alcohol, $C_{20}H_{32}O$; and an amorphous resene, m. p. 117°, $[\alpha]_D$ 16.1°, molecular weight about 800 *(6)*.

Turpentine and rosin may also be obtained from stumpwood by the steam distillation and solvent processes. These materials have also been investigated intensively. The wood turpentine contains 76% pinene, 9.8% limonene, 8.2% α-terpinene, 4% nopinene, 2.0% terpinolene, and a trace of γ-terpinene. It contains 20% of the monocyclic terpenes *(32)*.

Other investigators *(81)* report 80% α-pinene, β-pinene, camphene, dipentene, limonene, terpinene, and terpinolene; the nonhydrocarbon portion (about 2%) consists of secondary and tertiary terpene alcohols, aldehydes, phenols, phenolic ethers, and oxidation and polymerization products. Benzaldehyde, furfural, cineole, and sobrerol are present in very small amounts. Other references on wood turpentine are *96a, 110, 115*.

The steam distillate contains, in addition to all the turpentine, part of the pine oil. Steam distilled pine oil contains small amounts of limonene, dipentene, terpinene, and terpinolene, but is principally a tertiary terpene alcohol, such as α-terpineol; it also contains secondary terpene alcohols, fenchol, and borneol, together with a small amount of a phenol ether, methyl chavicol *(82)*.

Pinosylvin mono- and dimethyl-ethers are present; also a compound $C_{15}H_{12}O_5$ (probably 2, 3-dihydro-3-hydroxychrysin) *(33)*. The wood probably also contains pinobanksin, m. p. 173-175°, and phenols of the pinosylvin type *(35)*.

The ether extract of the sapwood contained 8.3—14.6% of unsaponifiable matter and that of the heartwood extract 10.2—25.2% of unsaponifiable matter. A typical analysis of the saponifiable portion of the sapwood extract gave 34.5% resin acids and 65.5% fatty acids, including 36.1% linoleic acid, 27.8% oleic acid, and 1.6% saturated acids. The unsaponifiable portion consisted of 31—60% of phytosterol. The heartwood extract shows dominance of resin acids over fatty acids and a much lower sterol content in the unsaponifiable portion than the sapwood ether extractives *(60)*.

The phytosterol from commercial tall oil is 22, 23-dihydrostigmasterol *(72)*.

The aqueous extract contains an arabogalactan *(40)*.

Tannin was not present *(92)*.

Pine, Pond *(Pinus rigida serotina)*

The volatile oil from the oleoresin, d^{20} 0.847, n^{20} 1.4734, $[\alpha]_D$ −105.36°, contains 80 to 90% of limonene *(48)*.

Tannin is not present *(92)*.

Pine, Ponderosa *(Pinus ponderosa)*

Solubility, per cent:

	(3a)		*(41)*
	Sap	Heart	
Cold water	1.0	3.3	4.1
Hot water	4.3	6.2	4.8—5.1
Ether	4.8	5.0	6.8—8.5
Alcohol-benzene.	5.1	7.2	4.4

Benzene, 2.22%; alcohol, 1.49% *(30)*.

Hot water, 2.1%; alcohol, 7.0% *(53)*.

Three mature trees from each of three widely distributed stands of ponderosa pine were analyzed to determine the distribution and nature of the acetone-soluble extractives from cross-sectional growth at various heights in the tree *(3b)*. Various locations in the sapwood showed 2.0 to 9.8% acetone extractives, and in the heartwood from 3.5 to 36.9%. The greatest quantity occurred at the butt heartwood; the least amount appeared at the outer sapwood. Average values for all trees in each stand showed variation from 3.3 to 3.9% in the sapwood, 8.8 to 10.3% in the heartwood, and 6.3 to 7.1% in the entire tree. The acetone extractives, whether from the heartwood or sapwood, contained resin acids, terpenes, free fatty acids, fats, and unsaponifiable material. The predominating component in the heartwood extractives was resin acids and in the sapwood was free fatty acids. The heartwood extractive was a brownish-red semisolid and that of the sapwood was a transparent yellow viscous liquid.

The volatile oil from oleoresin (18.5%), d^{15} 0.862, $[\alpha]_D$ −14.39°, contains 60—70% of l-β-pinene, 5% of l-α-pinene, and 20—25% of limonene *(97)*. The volatile oil from wood contains β-pinene, α-pinene, and limonene *(1)*.

The tannin content is 8.9% *(7)*.

Pine, Red *(Pinus resinosa)*

Alcohol-benzene + hot water extractives, 4.4% *(71)*.

The oleoresin had the following properties: d_4^{20} 0.8137, n^{20} 1.4788, $[\alpha]_D^{20}$ 4° *(42)*.

The volatile oil from the wood, d^{20} 0.8636, n^{20} 1.4713, $[\alpha]_D$ 17.4°, contains pinene *(42, 43)*. This oil is not identical with that from oleoresin. The rosin from the oleoresin contains a crystalline resin acid, $C_{20}H_{30}O_2$, m. p. 97—98°, in addition to abietic acid *(43)*.

Pine, Sand *(Pinus clausa)*

Solubility, per cent:

Hot water, 2.5; ether, 1.1; alcohol-benzene, 2.2 *(41)*.

The volatile oil from the oleoresin, d^{15} 0.8725, $[\alpha]_D$ −22.5°, n_D^{15} 1.4768, contains 75% of l-β-pinene, 10% of l-α-pinene, and 10% of l-camphene *(100)*.

Pine, Shortleaf *(Pinus echinata)*

Solubility, per cent:

	(26)	*(41)*
Hot water	2.1	2.6
Ether	2.3	2.0
Alcohol-benzene	3.0	..

	(60)	
	Sap	Heart
Ether	2.60—3.80	3.87—13.30
Alcohol-benzene	2.94—5.70	3.85—14.13

Alcohol - benzene extractives, 4.8%; water extractives (after alcohol-benzene), 1.2% *(53)*.

The distribution of the ether and alcohol-benzene extractives in a tree is not uniform *(60)*. Of the ether extract of the sapwood 6.4—14.6% was unsaponifiable, and of the heartwood extract 17.0—30.8% was unsaponifiable. A typical analysis of the sapwood extract gave 24.7% of resin acids and 75.3% of fatty acids, including 32.1% linoleic acid, 40.9% oleic acid, and 2.3% saturated fatty acids. The unsaponifiable portion contains 35—64% sterol. Less detailed data are given for the heartwood extract but resin acids predominate, and the sterol content of the unsaponifiable portion is much lower than in the sapwood.

The volatile oil of the oleoresin is predominantly d-pinene *(114, p 28)*.

Pine, Slash *(Pinus caribaea)*

Solubility, per cent:

	(26)	*(41)*	*(62)*
Hot water 1.9		3.6	....
Ether 1.4		3.3	1.83—15.20
Alcohol-benzene.2.7		..	....

	(76)		*(103)*
	Green	Seasoned	
Hot water	..	..	3.9
Ether	2.3	1.4	5.1
Alcohol-benzene ...	3.0	2.1	6.4

Alcohol - benzene extractives, 2.8%; water extractives (after alcohol-benzene), 0.8% *(53)*.

The benzene extractives of sapwood averaged 3.03% for 72 samples over a 5-month period *(11)*.

The volatile oil from oleoresin has d^{25} 0.8553, $[\alpha]_D$ −30—55°, and contains 75.6% of l-α-pinene and 21.2% of β-pinene *(31)*. Samples collected in two successive years were analyzed *(12)*.

	1931	1932
Rosin, %	77.6	78.0
Turpentine, % ...	20.4	19.7
Water and loss, %.	2.0	2.3
d_{15}^{15} of turps.....	0.8679	0.8674
n_D^{20} of turps.....	1.4695	1.4714
$[\alpha]_D^{20}$ of turps....	−18.31°	−20.33°

Another analysis, less detailed, gave 76.3—76.7% of rosin, 21.9—22.7% of turpentine, carbohydrates in the water-soluble fraction, and no tannin *(46)*. l-Pimaric acid in the oleoresin amounted to 23.1—24.5% and, in the scrape, 29.4—32.2% *(29)*. Dihydroabietic acid was found in the oleoresin and rosin *(37)*. The distribution and composition of the ether extractives in young turpentined and unturpentined trees have been examined *(62, 63)*. No material difference between these types was noticed except in back of the face.

The composition of the ether extractives from green and seasoned wood was investigated *(76)*.

	Green	Seasoned
Unsaponifiables, %	11.3	13.9
Rosin acids, %.....	42.8	47.3
Saturated fatty acids, %...	2.3	2.1
Unsaturated fatty acids, %	36.1	32.2

The sterol obtained from commercial tall oil, which includes that from slash pine, is 22, 23-dihydrostigmasterol *(72)*. The petroleum ether (60—70°) extract of young growing tips yielded: paraffins of C_8—C_9 range, tract of δ-pinene, melissyl alcohol, 10-nonacosanol, a sitosterol and a sitosterolin, palmitic and behenic acids, unsaturated fatty acids (apparently oleic and linoleic), and abietic acid *(47)*.

Tannins are not present *(91)*.

Pine, Spruce (*Pinus glabra*)

The volatile oil from the oleoresin contains *l*-pinene *(113)*. However, dextrorotation of the turpentine has been reported *(65, 114,* p. 20*)*.

Pine, Sugar (*Pinus lambertiana*)

Solubility, per cent:

	(3a)	
	Sap	Heart
Cold water	1.7	8.4
Hot water	3.1	10.3
Ether	3.1	4.5
Alcohol-benzene	3.8	12.0

Benzene extractives, 2.84%; alcohol extractives, 1.90% *(30)*.

The volatile oil from the oleoresin, d. 0.865—0.866, $[\alpha]_D$ 10.42°, contains 70—75% of *d*-α-pinene, 5% of β-pinene, 2—3% of other terpenes (possibly phellandrene), 2—3% of hydrocarbons (olefins?), and 10—12% of sesquiterpenes *(98, 114,* p. 27*)*.

Pinite, the methyl ether of *d*-inositol, m. p. 186°, $[\alpha]_D^{20}$ 65.4°, is found in the aqueous extract or sometimes as an efflorescence in seasoned lumber *(61, 114,* p. 27*)*.

Pine, Virginia (*Pinus virginiana*)

Benzene extractives, 1.18—1.36%; alcohol extractives (after benzene), 0.98—1.30% *(69)*.

Tannins are not present *(93)*.

Pine, Western White (*Pinus monticola*)

Solubility, per cent:

	(3a)		*(41)*	*(74)*
	Sap	Heart		
Cold water	2.3	2.7	3.2	....
Hot water	4.1	4.5	4.5	3.2—3.6
Ether	3.4	3.6	4.3	1.3—2.1
Alcohol-benzene	3.4	5.7	..	3.1—4.0

(89)

	Heartwood	
	Spring	Summer
Cold water	3.8	4.3
Hot water	5.2	5.4

The oleoresin has m p. 45—49°, d^{25} 1.045, $[\alpha]_D$ −1.58°, acid number 147.3, ester number 14.9, and iodine number 19.9. The volatile oil (15.8-20%), d^{20} 0.8691, $[\alpha]_D$ 20.6°, contains about 60% of *d*-α-pinene, 26% of β-pinene, 1% of undecane, limonene, and sesquiterpenes; phellandrene and sylvestrene are absent *(39)*.

Pine, White (*Pinus strobus*)

Solubility, per cent:

	(74)	*(88)*	
		Sap	Heart
Cold water		3.6	6.0
Hot water	4.6	5.2	7.7
Ether	3.0	5.5	3.6
Alcohol-benzene	6.9		

The volatile oil from oleoresin contains *l*-α-pinene, 8.6% of esters, and 5.2% of an unknown alcohol *(111, 114, p. 16)*.

The wood contains 0.5% of pinosylvin monomethyl ether, 0.1% of chrysin, 0.1% of tectochrysin, 0.004% of pinostrobin ($C_{16}H_{11}O_3$.OMe), 0.07% of strobopinin ($C_{18}H_{14}O_4$), 0.3% of pinite, 0.08% of "membrane substances," and $C_{15}H_{12}O_5$ (possibly 2, 3-dihydro-3-hydroxychrysin) *(33, 34)*.

Tannins are not present *(90)*.

Redwood (*Sequoia sempervirens*)

Solubility, per cent:

	(30)	*(41)*	*(55)*	
	Heart	Sap		Heart
Cold water	7.36			
Hot water	9.86	2.35-3.79		4.53—23.5
Ether	1.07			
Alcohol	4.39			
Benzene	0.34			

(64)

	Sap	Heart
Hot water	2.8	11.3
Alcohol-benzene	1.6	12.1
Alcohol	1.9	13.2

The amounts of hot water extractives in various parts of a redwood tree have been determined *(107)*. It was shown that, in old virgin-growth trees, there is a decrease of extractives at the center of the trunk with decrease in the height of the tree and a large increase at the outer edge of the heartwood with decrease in the height of the tree. Similar studies on young second-growth redwood have revealed that, although a corresponding variation in the extractive is usually perceptible, the tendency is toward a more uniform distribution *(107)*. Another investigator *(55)* examined four virgin-growth trees at one level (between 3 and 25 feet above ground level for any one tree) and found that the hot water extractives decreased gradually from the outer heartwood to the center of the tree. Contrariwise, a second-growth tree showed the reverse situation. A similar study was made at the Institute for alcohol extractives in various parts of a tree *(53)*.

The sapwood contained 1.15% tannin and the heartwood, 12.2% *(95)*. Redwood tannin shows excellent tanning properties *(94)*. Both tannin and phlobaphene have been isolated from the extracts and their chemical nature has been studied. The purified tannin contains 63.6% carbon, 5.6% hydrogen, 2.8% methoxyl, and 15.4% phenolic and 20.3% hydroxyl groups. It contains 24% of material not absorbed by hide powder, but this fraction has about the same methoxyl and hydroxyl content as the total fraction. The phlobaphene contains 66.8% carbon, 5.9% hydrogen, 6.9% methoxyl, and 10.1% phenolic groups (13.7% total hydroxyl groups). The high methoxyl content, however, indicates that some native lignin may be present. Derivatives of these substances and their properties (ultraviolet absorption spectra) have been reported *(22)*. The heartwood contains pinite (monomethylcyclohexanehexol) *(104)* and sequoyitol, m. p. 234-235°, (a monomethyl ether of inactive inositol) *(105)*. Two coloring matters were found in the heartwood: isosequein, m. p. 188° and sequoyin, $C_{28}H_{28}O_{10}$, m. p. 214°. Sequoyin hydrolyzes to sequein, $C_{20}H_{20}O_8$, and sequeinol, $C_{18}H_{18}O_4$. These give color reactions similar to those of tannin and phlobaphene *(106)*.

Spruce, Black (*Picea mariana*)

Solubility, per cent:

	(28)	*(53)*
Hot water	2.1	2.2
Ether		0.6
Alcohol-benzene	2.2	1.73—1.89

Alcohol-benzene + hot water extractives, 2.7% *(71)*. Successive extractions: water 3.28; ether, 0.63; alcohol, 0.96; total, 4.87% *(53)*. The location of ether, alcohol, and water extractives was determined by means of fluorescence analysis. The relative intensities of the fluorescence of spruce sapwood extracted with various solvents are shown by curves *(73)*.

Arabogalactan (0.1-0.2%) has been found in the water extract. It contains 13.2% uronic anhydride, 65.3% galactan, and 11.5% araban. The acetate is insoluble in water and common organic solvents; glucose, xylose, and mannose are absent *(15)*.

Native lignin (2-3%) was obtained by alcohol extraction. The behavior of this extractive on methylation and acetylation has been described *(14)*. Conidendrin has been found in the branches of young trees *(36)*. Ether extractives (0.8%) contain 20.9% unsaponifiable matter, 38.7% unsaturated fatty acids, 2.6% saturated fatty acids, and 30.7% resin acids. The unsaponifiable material contains a large amount of a phytosterol, $C_{29}H_{50}O$, m. p. 135.5-136°; acetate, m. p. 118.5-119°, $[\alpha]_D$ −36.2°; benzoate, m. p. 141-142° (probably identical with 22, 23-dihydrostigmasterol) *(119)*.

Spruce, Engelmann (*Picea engelmannii*)

Conidendrin has been found in the branches of young trees *(36)*.

Spruce, Red (*Picea rubra*)

Solubility, per cent:

	(56)	*(87)*	
		Sap	Heart
Hot water	1.60—2.52		2.56—3.39
Ether	0.58—1.17		0.77—1.45
Alcohol	1.25	1.09—1.38	1.06—2.41
Benzene	0.61		

Conidendrin could not be found in branches from young trees *(36)*.

Spruce, Sitka (*Picea sitchensis*)

Solubility, per cent:

	(5)	*(13)*	*(41)*
Hot water	3.82	2.8	5.0
Ether	...	0.31	0.8
Alcohol-benzene	2.61	2.3	4.5

Conidendrin was not found *(36)*.

Spruce, White (*Picea glauca*)

Hot water extractives, 2.1-3.2%; ether extractives, 0.4-1.4%; alcohol-benzene extractives, 1.8-2.3% *(41)*, 1.74-2.13% *(53)*; alcohol-benzene + hot water extractives, 2.6% *(71)*.

Spruce gum contains 79.5% rosin and 16% of a volatile oil, of which about 50% is *a*-pinene *(52)*.

Extraction of "sprucewood" by organic solvents gives 1-2% of an aromatic ketone (oil), $b_{0.005}$ 140-150°; methylation gives a white crystalline compound, $C_{15}H_{18}O_4$, m. p. 81-82°, which contains the veratryl

radical. Other products in the extracts include a polymerized compound, an aldehyde, an acid, a neutral substance, and a carbohydrate-containing fraction, the total yield being 5% *(27)*. Conidendrin has been reported *(36)*.

Tamarack (*Larix laricina*)

Alcohol-benzene + hot water extractives, 10.9% *(71)*.

The wood contains up to 4% of a water-soluble arabogalactan, white powder, $[\alpha]_D^{20}$ 13°, reducing value about 34 mg. of cuprous oxide per 500 mg. of polysaccharide; it yields about 82% galactose and 12.6% arabinose on hydrolysis. This is probably not homogeneous, although evidence in favor of the formula $[(C_6H_8O_4)(C_6H_{10}O_5)_6]_n$ has been presented. It forms a benzoate, an acetate, and a propionate that may be fractionated *(84, 118)*.

Flavones are probably present in the wood *(59)*.

HARDWOODS

Alder, Red (*Alnus rubra*)

Solubility, per cent:

(89)

	Heartwood	
	Spring	Summer
Cold water	3.02	3.03
Hot water	4.01	4.16

Tannin, 0.7% *(7)*.

Aspen, Bigtooth (*Populus grandidentata*)

Solubility, per cent:

	(13)	*(44)*	
		Sap	Heart
Cold water	...	2.70	1.36
Hot water	2.4	3.13	0.99
Ether	0.86	1.02	1.03
Alcohol-benzene	2.6	2.41	2.13

Aspen, Trembling (*Populus tremuloides*)

Solubility, per cent:

	(41)	*(20)*
Hot water	2.6—3.3	.....
Ether	1.1	.....
Alcohol benzene	.....	1.3—2.8

Alcohol-benzene + hot water extractives, 4.6% *(71)*.

Basswood (*Tilia glabra*)

Solubility, per cent:

	(41)
Cold water	2.12
Hot water	4.07
Ether	1.96

Alcohol-benzene + hot water extractives, 8.8% *(71)*.

The oil from the wood is rich in volatile fatty acids (*114*, p. 754; *117*).

Beech (*Fagus grandifolia*)

Solubility, per cent:

(44)

	Sap	Heart
Cold water	2.33	0.23
Hot water	2.17	0.43
Ether	0.20	0.57
Alcohol-benzene	1.37	0.96

(87)

	Sap	Heart
Hot water	0.97	0.70
Ether	0.19—0.26	0.38
Alcohol	2.24	1.30

Tannins are not present *(90)*.

Birch, Paper (*Betula papyrifera*)

Solubility, per cent:

	(41)	*(44)*	
		Sap	Heart
Cold water	... .	1.28	1.12
Hot water	2.1—3.1	2.39	2.15
Ether	0.9—1.0	0.79	2.19
Alcohol-benzene	3.2—5.8	3.31	6.44

(87)

	Sap	Heart
Hot water	1.20—2.64	1.63—3.09
Ether	0.98—2.97	1.57—3.89
Alcohol	1.84—2.19	2.13—5.10

Alcohol-benzene + hot water extractives, 4.6% *(71)*.

Birch, River (*Betula nigra*)

Tannins are not present *(93)*.

Birch, Yellow (*Betula lutea*)

Solubility, per cent:

	(41)	*(44)*	
		Sap	Heart
Cold Water	... ...	1.20	0.93
Hot water	..... 4.0	1.30	1.29
Ether	..... 0.6	0.36	0.30
Alcohol-benzene	....	0.97	1.89

(87)

	Sap	Heart
Hot water	1.39	1.41
Ether	0.44-0.60	0.94-1.18
Alcohol	2.14	6.52

(88)

	Sap	Heart	Sap	Heart
Cold water	1.05	4.16	1.74	2.76
Hot water	1.98	5.69	2.10	3.96
Ether	0.48	0.81	0.88	0.99

Catalpa, Northern (*Catalpa speciosa*)

Solubility, per cent:

(89)

	Sap		Heart	
	Spr.	Sum.	Spr.	Sum.
Cold water	9.12	7.29	7.51	2.69
Hot water	12.4	10.1	11.7	5.26

Chestnut (*Castanea dentata*)

Tannins: sapwood, 2—4%; heartwood, 7-12% *(79)*; stump and roots, 15% *(45)*.

Cottonwood, Eastern (*Populus deltoides*)

Alcohol-benzene extractives, 0.9% *(20)*.

Cottonwood, Northern Black (*Populus trichocarpa hastata*)

Tannin, 1.8% *(7)*.

Cottonwood, Southern (*Populus deltoides virginiana*)

Solubility, per cent:

	(18, 68)
Hot water	2.0
Ether	0.4
Alcohol-benzene	1.8

Gum, Black (*Nyssa sylvatica*)

Hot water extractives, 4.0%; ether extractives, 0.4% *(41)*.

Gum, Red (*Liquidambar styraciflua*)

Solubility, per cent:

	(41)	*(53)*
Hot water	2.5	6.8
Ether	0.5	...
Alcohol-benzene	2.0-2.5	4.2

Tannins are not present *(93)*.

Scarification of the living tree yields "American storax." This is reported to contain 22.4% essential oil, 0.32% ash, 5.2% ether-soluble material, 6.6% alcohol-insoluble material, 22.9% cinnamein (a mixture of esters, containing among others, esters of cinnamic acid), 34.8% resin esters, 2.11% resin acid, and 12.65% cinnamic acid (fresh exudate contains little free acid); styracin (cinnamyl cinnamate) may also be present, as well as styrene, phenylpropyl cinnamate, and various resinols. The essential oil is dextrorotatory *(114*, p. 431; most recent reference is *58)*.

Gum, Swamp Black (*Nyssa biflora*)

Solubility, per cent:

	(41)
Hot water	3.3-4.4
Ether	0.3-0.5
Alcohol-benzene	2.5-3.1

Maple, Red (*Acer rubrum*)

Solubility, per cent:

(87)

	Sap	Heart
Hot water	2.13	2.32
Ether	0.16-0.51	0.21-0.31
Alcohol	2.78	2.33

Tannins are not present *(90)*.

Maple, Silver (*Acer saccharinum*)

Alcohol-benzene + hot water extractives, 3.8% *(71)*.

Maple, Sugar (*Acer saccharum*)

Solubility, per cent:

	(41)	*(44)*	
		Sap	Heart
Cold water	2.65	0.81	0.52
Hot water	3.4-4.4	2.08	1.20
Ether	0.25-2.3	0.1	0.89
Alcohol-benzene	5.2	1.31	1.22

(87)

	Sap	Heart
Hot water	0.34	2.09
Ether	0.23-0.26	0.25-0.33
Alcohol	3.64	2.59

OAKS

In the following, solubility data on certain species are given separately; the data on tannins are given under the lists of the white and red oaks:

Blackjack (*Quercus marilandica*)

Solubility, per cent:

	(18)
Hot water	4.7
Ether	0.6
Alcohol-benzene	3.5

Northern Red (*Q. borealis maxima*)

Alcohol + alcohol-benzene + hot water extractives, 7.3% *(71)*.

Overcup (Q. lyrata)

Successive extractions: water, 9.0; ether, 0.33; acetone 0.63; alcohol, 0.43; water, 2.4; total, 12.8% *(53)*.

Post (Q. stellata)

Alcohol-benzene extractives, 4.1%; hot water (after alcohol-benzene), 5.0% *(53)*.

Southern Red (Q. rubra)

Successive extractions: water, 6.7; ether, 0.24; acetone, 0.49; alcohol, 0.46; water, 1.89; total 9.8% *(53)*.

White (Q. alba)

Solubility, per cent:

	(88)			
	Sap	Heart	Sap	Heart
Cold water	2.55	7.33	4.27	4.76
Hot water	4.11	10.15	5.73	6.60
Ether	0.46	0.71	0.65	0.62

Alcohol + alcohol-benzene + hot water extractives, 7.0% *(71)*.

Red Oak Group

Species	Tannin, per cent *(92, 93)*
Black *(Q. velutina)*	slight
Blackjack *(Q. marilandica)*	slight
Dwarf post *(Q. stellata margaretta)*	5.4
Laurel *(Q. laurifolia)*	none
Live *(Q. virginiana)*	6.9
Northern red *(Q. borealis maxima)*	2.5
Pin *(Q. palustris)*	none
Scarlet *(Q. coccinea)*	none
Shumard red *(Q. shumardii)*	none
Southern red *(Q. rubra)*	1.8
Swamp Spanish *(Q. pagoda)*	slight
Turkey *(Q. laevis)*	2.4
Upland willow *(Q. cinerea)*	1.3
Water *(Q. nigra)*	1.0
Willow *(Q. phellos)*	slight

White Oak Group

Species	Tannin, per cent *(92,93)*
Chestnut *(Q. montana)*	3.3
Overcup *(Q. lyrata)*	slight
Post *(Q. stellata)*	2.9
Swamp chestnut *(Q. prinus)*	3.1
White *(Q. alba)*	2.7

Tulip-poplar (Liriodendron tulipifera)

Solubility, per cent:

	(41)
Hot water	2.0-2.9
Ether	0.27-0.58

	(88)			
	Sap	Heart	Sap	Heart
Cold water	1.29	1.50	1.45	1.45
Hot water	1.98	2.08	2.51	2.89
Ether	0.27	0.43	0.13	0.58

Willow, Black (Salix nigra)

Solubility, per cent:

	(18, 68)
Hot water	3.6
Ether	0.3
Alcohol-benzene	2.2

Tannins are not present *(90)*.

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U. S. Forest Growth Shows Gain*

▶▶▶ AMERICA'S FORESTS are growing at the rate of more than thirteen billion cubic feet of wood yearly, their greatest recorded growth, according to the forest reappraisal figures just released by the U. S. Forest Service. This is two billion cubic feet greater than in 1936 when the last forest appraisal was made.

The combined figures for sawtimber and cordwood growth indicate that America's wood supply is now being replaced nearly as rapidly as it is cut for use and destroyed by fire, insects or disease. Figures for hardwood growth show trees in this category to be growing faster than they are logged for use or destroyed. However, we are still using our larger trees, classed as sawtimber, hardwood and softwood combined, fifty per cent faster than they are being replenished, the survey shows.

Interpreting the figures, Colonel W. B. Greeley, former U. S. Forest Service Chief and chairman of trustees of the American Forest Products Industries, Inc., pointed out that much of the improved growth is due to a nearly 50 per cent reduction in forest fire losses for the period covered by the appraisal.

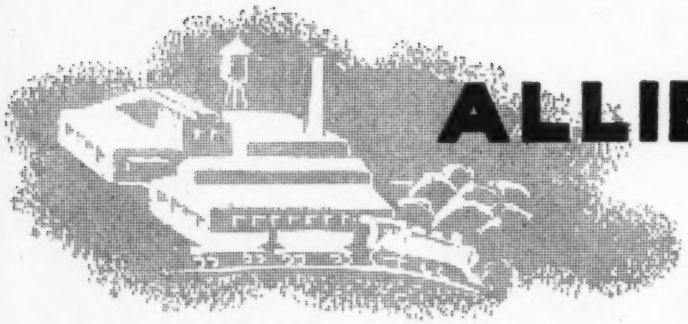
"Widespread support for such forest protection campaigns as the Keep America Green program, as well as decreased travel in forested areas during the war years, helped reduce the number of fires," the Colonel stated. "With the upswing in tourist travel, the need for public support of forest protection becomes even more important. Aggressive vigilance is necessary if we are to maintain the gains made during the past ten years. We must do still better."

To bring the growth of sawtimber up to use and loss figures, as well as increase wood production all along the line, Colonel Greeley advocated improved forest management as fostered by the nation-wide Tree Farms movement. "By good forest practices, we can not only increase the percentage of trees of sawtimber quality," he stated, "we can greatly increase the supply of wood for pulp and paper and every other forest product. We should bring all our forest lands up to full production for whatever timber crop each area is best adapted to grow."

(*) Released by American Forest Products Industries, Inc.

Paper SKETCHES . . . . . .

CORPORAL PUNISHMENT AND THE CONFISCATION OF PAPER STOCK WAS THE PENALTY IMPOSED UPON FRENCH PAPERMAKERS IN 1538 CAUGHT COUNTERFEITING THE WATERMARKS OF ANOTHER MEMBER OF THE TRADE.
TWENTY-TWO MILLION UNUSED ARMY MAPS PREPARED FOR USE IN WORLD WAR II, AND COVERING BOTH EUROPE AND JAPAN, HAVE BEEN SOLD AS PAPER STOCK.
IN 1382, PAPER IN ITALY COST ONE SIXTH AS MUCH AS PARCHMENT.
AS EARLY AS 1725, A HOLLANDER IN FREIBERG, GERMANY, TREATED AS MUCH STOCK IN ONE DAY AS SIXTY-FOUR STAMPER HOLES.

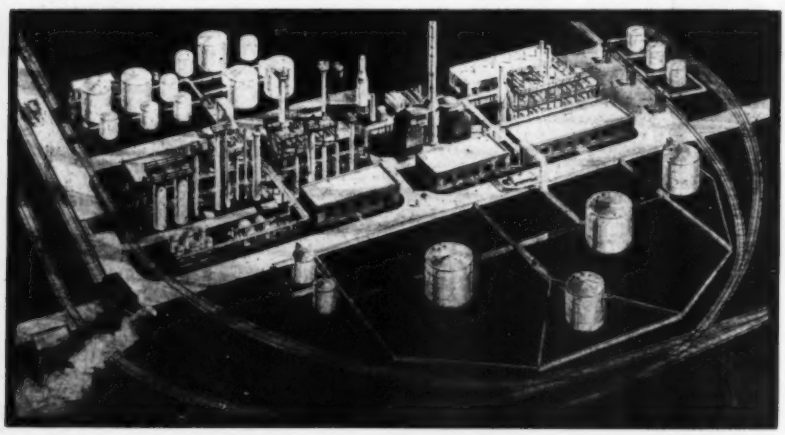


WYANDOTTE CHEM. CORP. EXPANDING—TO ENTER ORGANIC CHEMISTRY FIELD

A program of expansion and diversification costing $25,000,00 is under way at Wyandotte Chemicals Corporation plants. According to estimates made by the company, it is expected this program will increase its sales by more than 30 per cent by 1948. An important innovation is the fact that Wyandotte will enter the organic chemicals field on a large commercial scale after producing inorganic chemicals and cleaning materials for over fifty years.

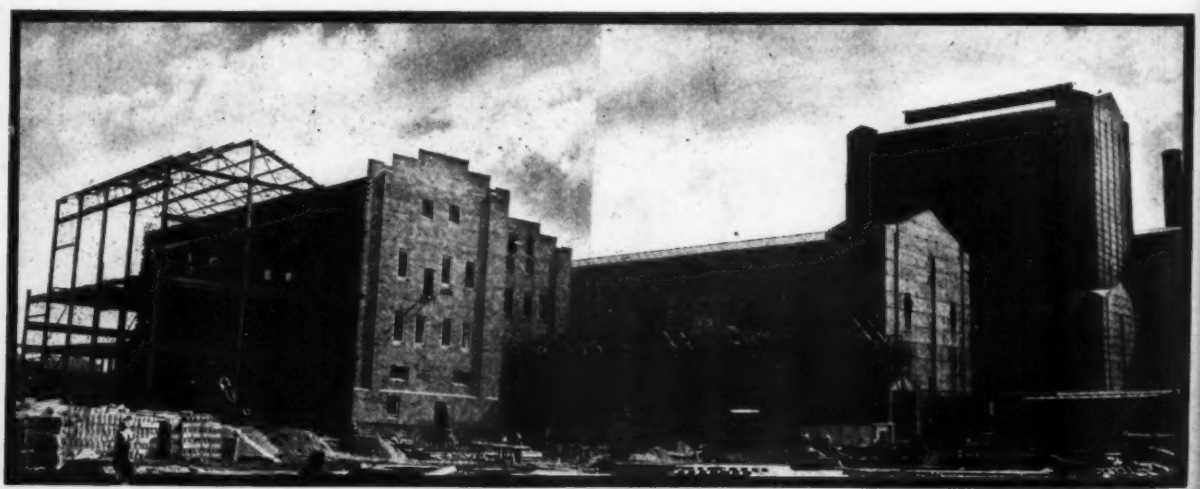
A program of technical research initiated prior to 1940 indicated that the best field for diversification lay in the manufacture of organic chemicals. Therefore, the company's organic research program was expanded under the leadership of Dr. T. H. Vaughn, director of research. Because of wartime restrictions, the company's entry into the field of glycols and related compounds has been delayed. However, the buildings to house this new plant are almost completed and new equipment will be installed as fast as it can be manufactured. It is expected the new plant will be in production by the spring of 1947.

E. M. Ford, president Wyandotte Chemicals Corporation

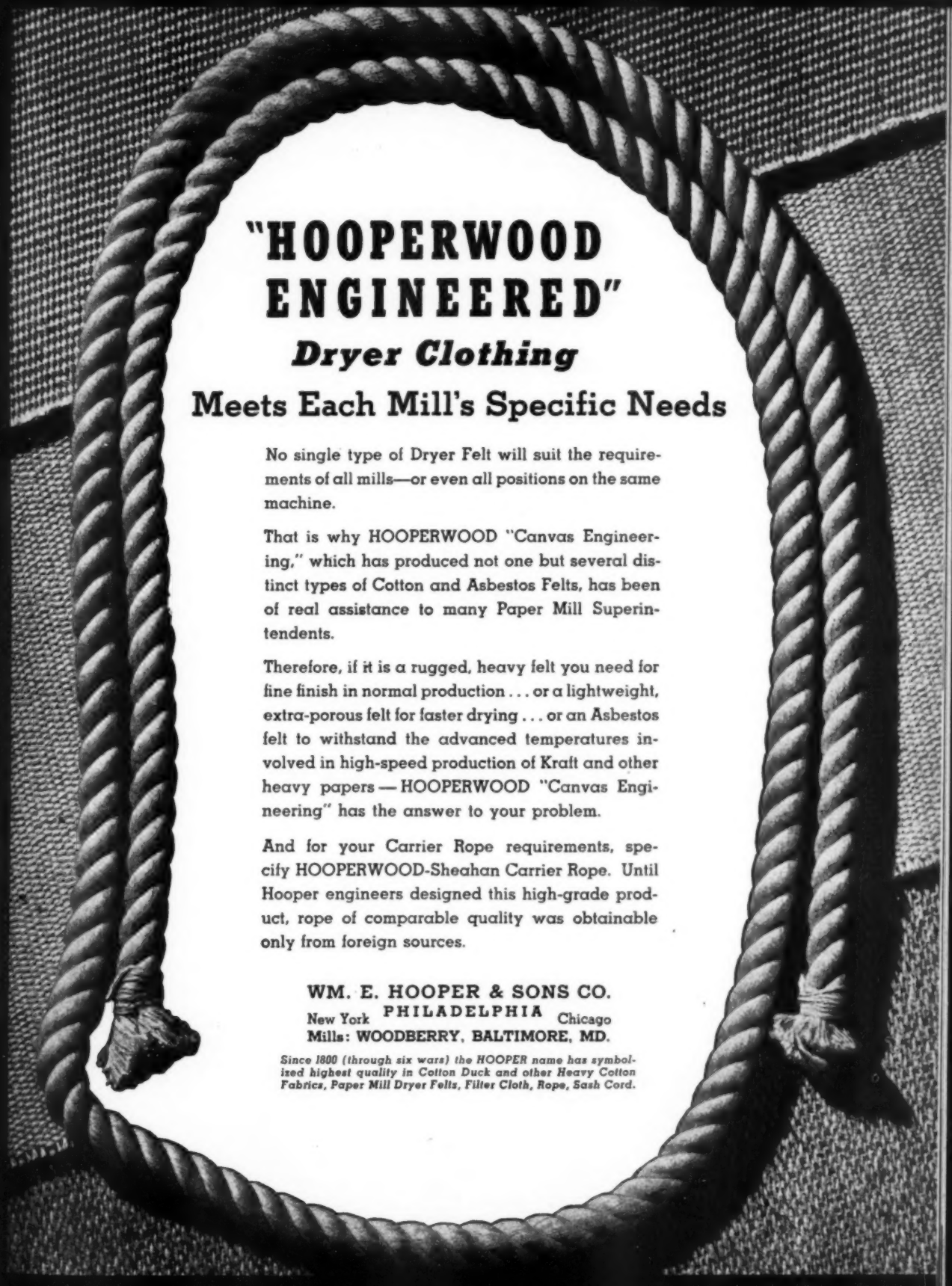


Sketch of Glycol plant, part of Wyandotte Chemical Company's $25,000,000 expansion program

Another organic chemicals plant included in the program is a large scale commercial unit to be completed in the fall of 1947 for production of synthetic detergent. The expansion phase of the new construction program includes increased capacity for almost all of the company's alkali products. Soda ash capacity will be stepped up by 15 per cent. There



New units of calcium carbonate plant of Wyandotte Chemical Company scheduled for completion by January, 1947. Tanks in foreground are slurry thickeners. Long building behind tanks is part of the Wyandotte bicarbonate plant. Next building to the left is the original calcium carbonate unit. The large building at the right is the North Plant soda ash production unit



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HOOPERWOOD DRYER FELTS

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will be a general production increase in chlorine and calcium carbonate. The company feels this additional capacity will enable it to keep pace with the growing demands of its customers in the pulp and paper industries, as well as the other industries it serves.

◆

LAWSON PRESENTS NEW PRODUCT TO PRINTING AND ALLIED INDUSTRY

Over one-hundred representatives of the printing and allied industries were present at the first showing of the new Lawson Multiple Head Drill which was on display July 29, at the E. P. Lawson Company showroom in New York City.

President of the Lawson Company, David W. Schulkind pointed out the salient features of the machine which drills two or more holes in a two inch lift of paper in less than three seconds; and following the dedication ceremony he demonstrated the operation of the machine. William J. Hourigan, treasurer, officiated at the unveiling. He was assisted by Lawson Williams and Herman Sinnigen who are vice presidents of the company. Harvey Glover, president of the Sweeney Lithograph Company, Belleville, New Jersey, christened the machine.

In April of this year Lawson introduced the Lawson "38" paper cutting machine (Cf. P. I. & P. W., May, 1946).

◆

▶▶▶ SALES DISTRIBUTORS in Canada for the E. P. Lawson Company (New York City) will be Sears, Limited. The Canadian agency will handle the Lawson lines of paper cutters, multipule head drill slotters, and multipule head round hole drilling machines.

Following unveiling ceremonies for the new Lawson Multiple Head Drill at the showrooms of E. P. Lawson Company, New York City, on July 29, David Schulkind, president of the company, called for a demonstration drill

RELIANCE ESTABLISHES NEW SALES OFFICES AND EXPANDS SALES FORCE

In order to provide wider coverage to the industries which it serves, The Reliance Electric & Engineering Company, Cleveland, Ohio, is establishing additional sales offices and expanding its present field sales force.

George E. Law, who has recently been released from the Armed Forces and has represented Reliance in Minneapolis, will head a new branch office is Appleton, Wisconsin.

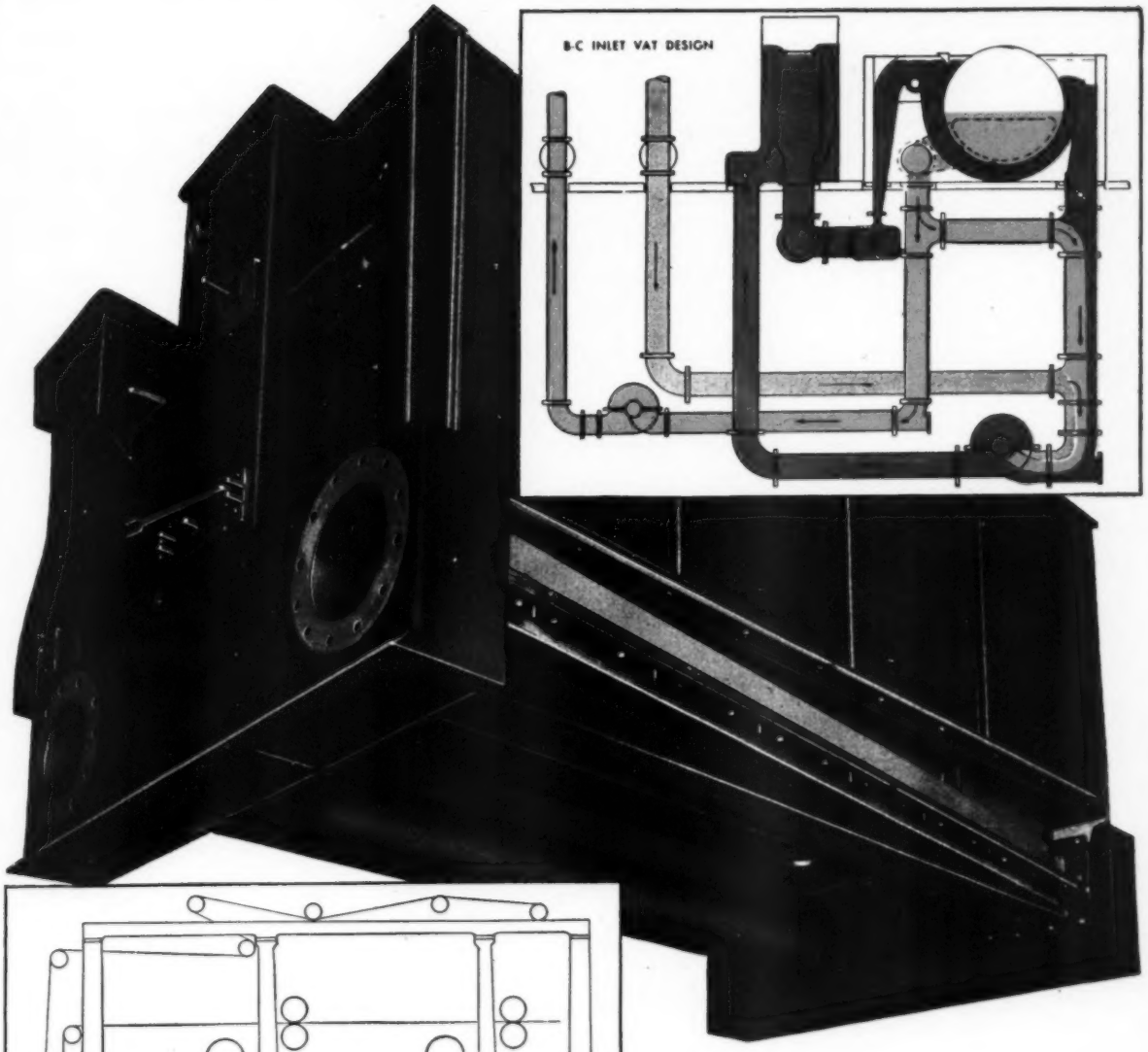
The company's representative in western Michigan for the past several years, M. J. Sandling, will take charge of operations of a new office to be opened in Grand Rapids, Michigan. W. F. Cliff, who joined the Reliance staff recently, will assist Mr. Sandling.

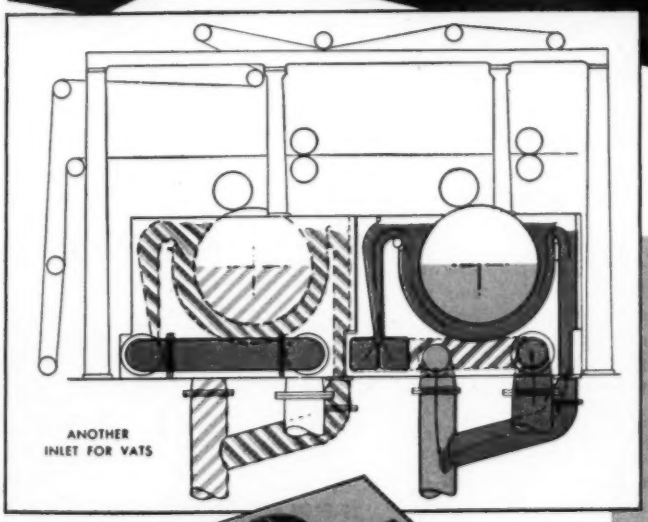
E. H. Koontz, sales engineer for the company, who handled war subcontracts in the naval ordnance program for Reliance in Minneapolis, is now associated with the New York office.

William K. Schlotterbeck, another Reliance veteran to receive his discharge recently, rejoins the Philadelphia office as sales engineer.

Other sales engineers assigned to the expanding sales offices are: R. L. Custis, to New York; D. M. Larson, to Minneapolis; A. C. Perrin, to Chicago; and Albert Mann, to Detroit.

Left to right—George E. Law, Douglas M. Larson, E. H. Koontz, and Wm. K. Schotterbeck, all of Reliance Electric & Engineering Co.





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DOWNINGTOWN WILL MAKE TWO MACHINES FOR U. S. GYPSUM COMPANY

Agreements have been signed by the Downingtown Manufacturing Company of Downingtown, Pennsylvania, and the United States Gypsum Company of Chicago, Illinois, which provide that the Downingtown Manufacturing Company will build for the United States Gypsum Company two large combination paper machines and furnish all of the stock preparation equipment for two combination felt and paper mills.

The Engineering Department of the United States Gypsum Company made an exhaustive study of the most economical methods of producing papers and felts. The results of this study were embodied in a complete engineering report including proposed mill designs and anticipated production costs.

It was decided to build one mill on the Pacific Coast and one mill on the East Coast.

The stock preparation system design and layout is being made by Polleys and Baxter, Consulting Engineers of Middletown, Ohio.

◆

▸▸▸ INSTALLATION OF a 2-million-volt X-ray machine for the purpose of examining welds in pressure vessels will be completed by The Babcock & Wilcox Company, Barberton, Ohio, this fall. The new equipment will be housed in an especially constructed building designed to prevent radiation. Ground for the new building has been broken. Cost of the equipment, together with the facilities for housing, it will be $150,000. When the equipment is in operation it will be used principally at the higher voltage ranges to examine welds of four inch thickness and over.

◆

SULPHUR ON CELLULOID

Freeport Sulphur Company has recently announced the release of a new motion picture pertaining to sulphur mining at its Grand Ecaille and Hoskins Mound mines in Louisiana and Texas, respectively. Entitled, "Yellow Magic—The Story of Sulphur," this educational film shows not only modern mining methods but also early history of sulphur mining in America. It recreates the historic scene in Louisiana some 50 years ago when the first American sulphur was mined by what was then a revolutionary process using super-heated water and compressed air. The motion picture—a 16 mm. sound film in color, requiring about 35 minutes showing time—may be obtained without charge for showing to clubs, schools, and civic groups. (*Brimstone Brevities*, No. 11, July, 1946, Freeport Sulphur Co., 1804 American Bank Bldg., New Orleans 5, La.)

◆

AMERICAN CYANAMID REORGANIZES DYE APPLICATION LABS.

The mounting activity in the paper, textile, and leather industries is reflected in the recent announcement by the Calco Chemical Division of the American Cyanamid Company, Bound Brook, New Jersey, that its Dye Application Laboratories will be reorganized to meet the expansion of the industries which Calco serves.

The reorganization will effect the consolidation of the Dye Application Laboratories into three main divisions:

F. O. Sundstrom

The Textile Division, the Leather, Paper, and Plastic Division, and the Evaluation and Testing Division.

The operation of the new divisions will be under the direction of men well known to the dye consuming industries.

W. H. Watkins, manager of the Dye Application Laboratories, will be assisted by A. L. Peiker, who will act as associate manager and administrative assistant.

F. O. Sundstrom has been named assistant manager of the leather and paper section, and W. H. Peacock, assistant manager of the plastics and specialties section of the Leather, Paper, and Plastic Division.

O. W. Clark has been appointed assistant manager in charge of the cotton, viscose rayon, and resin bonded pigments section of the Textile Division.

E. E. Millson has been appointed assistant manager to direct the wool, nylon, acetate, and specialties section of the Textile Division.

In the Evaluating and Testing Division, R. R. Sleeper will be in charge of new product evaluation, and F. C. Dexter will be in charge of pigment testing and identification.

◆

PATENT SUIT DISMISSED

The Federal Court of Appeals, Second Circuit, has reversed a decision of the Federal District Court and has dismissed a bill of complaint made by the Foxboro Company, Foxboro, Massachusetts, against the Taylor Instrument Companies.

The suit involved the Mason patent held by the Foxboro Company which the court declared ineffective since it did not cover anything patentable over prior work performed by earlier scientists.

The Fulscope air-operated instrument around which the litigation centered, is used in industrial processes to control automatically temperature, pressure, and humidity, as well as flow and liquid level.

◆

INCO OPENS TECHNICAL SECTION OFFICE IN TEXAS

Technical information and assistance will be furnished industry in matters relating to alloys containing nickel by the Texas Technical Section of the Development and Research Division of the International Nickel Company. INCO has opened this new section to serve industry in the states of Texas, Oklahoma, Louisiana, Mississippi, and southern Arkansas.

R. J. Rice will be in charge of this new development. Mr. Rice is metallurgical and chemical engineer for INCO. In the past he has been affiliated with the Beaumont Iron Works Company, the Metal Goods Corporation of Houston, Texas, the War Production Board, and the United States Navy. After his release from the Navy, Mr. Rice joined the staff of INCO.

◆

G-E PLASTICS DEVELOPMENT BEGINS FIRST PRODUCTION AT COSHOCTON, OHIO, PLANT

Initial production in a five million dollar factory that is designed to be the largest and most modern plastics laminating plant in the country, was started by the General Electric Company plastics division, August 1, at Coshocton, Ohio.

The new plant replaces the present G-E facilities for the manufacture of

OPEN A TURBINE which has operated up to fifteen years or even longer, and in which oil has never been changed—or even treated. What do you expect to find? Certainly not the clean oil cooler shown in the illustration. Yet such cleanness is the common expectation where Nonpareil Turbine Oil has been used. Not only the cooler but the whole turbine oil system, including oil tank and governor mechanism, will show no deposit caused by oil deterioration.

Here's why. For eighteen years Nonpareil has had two unusual characteristics. It is refined so that all asphaltene-formers are removed—that is, it is rendered free from these deposit-forming elements. Then, in addition, inhibitors are added to prevent acidity formation. This eliminates another source of deposit trouble. Together these qualities have made Nonpareil unique in the turbine oil field—*it is guaranteed for the life of the turbine* against excessive acidity increase.

NONPAREIL
TURBINE OIL

You can forget turbine oil system cleaning and oil maintenance problems once you have installed Nonpareil Turbine Oil.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

laminated materials at Lynn, Massachusetts. Three buildings, in addition to the main factory building, make up the new operating facilities at Coshocton, and add a total of 235,820 square feet of space. The expected output of the Coshocton plant is double the present production schedule.

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▶▶▶ THREE LARGE VACUUM-PRESSURE treating cylinders have been placed in operation at the American Lumber and Treating Company's new wood-preserving plant in Florence, South Carolina. The treating operations are concentrated on the production of creosoted cross ties, Wolmanized lumber, and Minalith flameproofed lumber and plywood. While operation of the treatment facilities is under way, construction work on the 143-acre plant site is nearing completion.

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▶▶▶ IN ORDER TO FACILITATE the distribution of the products manufactured by the H. M. Harper Company, Chicago, a new branch has been opened by the company in Dallas, Texas. The new development was established to enable Harper to better serve the southwestern section of the country. The Dallas branch will be headed by W. H. Kreer who was formerly associated with Templeton Kenly & Company.

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▶▶▶ A NEW OXYGEN CYLINDER filling station and Presto-O-Lite acetylene producing plant is being constructed by The Linde Air Products Company (a unit of Union Carbide and Carbon Corporation), at Boise, Idaho. This new development will provide a source of supply and servicing for the industries in the Boise area.

◆

▶▶▶ THE NEW OFFICE of the Chicago Branch of the Pigment Department of the Calco Chemical Division of the American Cyanamid Company, Bound Brook, New Jersey, is located at 228 North LaSalle Street, Chicago 1, Illinois. Gerald J. Boyer, Kenneth A. Coate, and Paul J. Cuenot will make their offices at this address.

◆

▶▶▶ ACQUISITION OF the Brake Equipment & Supply Company of Chicago by the H. K. Porter Company, Pittsburgh, Pennsylvania, took place recently. The Brake Equipment company is engaged in the manufacture of brake parts for railway locomotives and freight cars, and airbrakes for export trade. The sales of this new Porter development will be handled by the Porter Railway Sales Division.

CHAIN BELT PURCHASES HEAVY ORDNANCE PLANT

The Chain Belt Company of Milwaukee has purchased a heavy ordnance plant from the Defense Plant Corporation. The plant is located in West Milwaukee, Wisconsin. The plant was constructed in 1943 and was used in the manufacture of anti-aircraft guns, 155 MM, "Long Toms," and the 105 MM Howitzer.

Under the ownership of Chain Belt Company, plans have been made to use the plant in the manufacture of chain belts and some construction machinery. The acquisition of this factory increases the total of Chain Belt plants to more than twenty acres.

◆

▶▶▶ THE OPENING OF A NEW Philadelphia office of The General Detroit Corporation and The General Pacific Corporation has been announced. The opening of this new office is in line with the company's policy in the expansion of its sales activities. Elmer A. Marquardt has been appointed zone sales manager with headquarters in the new office.

Elmer A. Marquardt

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▶▶▶ A THREE-SHEET RAG felt machine has been ordered for the Johns-Manville plant, Manville, New Jersey. The new machine is a cylinder type with a 114-inch trim and a rated capacity of 100 tons a day of fifty-pound rag felt. Plans are being considered to move the felt machine now in operation at the Manville plant to the factory at Pittsburg, California. It is expected the new machine will be in operation the early part of 1947.

▶▶▶ PLANS FOR THE installation of a full-scale process for continuous manufacture of precipitated pigment colors has been announced by the Pigments Department of the DuPont Company. The installation will be made in the company's buildings already available at the Newark, New Jersey, pigment plant. New facilities, which follow extensive research, will reduce the processing time from four or five days to a few hours in the manufacture of chrome pigments.

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▶▶▶ ANNOUNCEMENT HAS BEEN made by the Johns-Manville Corporation that the contract for the construction of a new insulating board factory at Natchez, Mississippi, has been awarded to the engineering firm, Ford, Bacon, and Davis, of New York City. Construction is planned to begin before January, 1948. When in operation the factory will have an annual gross capacity of 200,000,000 square feet of insulating board.

◆

▶▶▶ SCIENTIFIC ADVANCES made during wartime have aided in the development of equipment for the non-destructive examination of high pressure pipe lines for internal corrosion and erosion. Sam Tour and Company, Incorporated, New York City, has recently extended its services to industry in the developing of its facilities for research in this field. By using non-destructive means for the examination of pipe lines, it is possible to avoid the dismantling of equipment and drilling of test holes, saving both time and equipment.

◆

▶▶▶ THE MINE AND SURFACE inventory of the Kentucky Babb Fluorspar mine near Salem, Kentucky, has been purchased by the Pennsylvania Salt Manufacturing Company of Philadelphia. The acquisition of the mine by Pennsalt was made from Roberts and Frazer, active in other fluorspar mining operations as the Kentucky Fluorspar Company. Underground exploration of the Kentucky Babb mine has been made by Pennsalt, but production from it has not begun.

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▶▶▶ A COLOR AND SOUND film being produced by Harris Seybold Company, Cleveland, Ohio, is in the last stages of production and will be released shortly. The film will provide an elementary, non-technical, picture story of the sources of offset lithography's many advantages. The title of the motion picture is "How to Make a Good Impression."

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Industrial Trucks do more work...

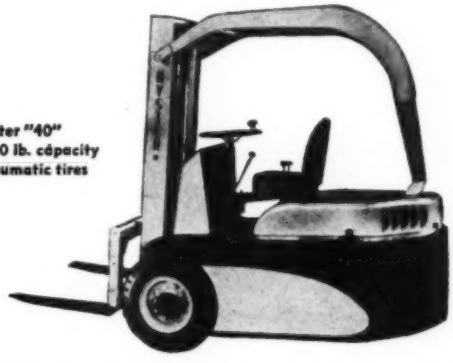
Regardless of your business — a quick and guaranteed method of increasing net profits is to cut materials handling costs by using Hyster industrial lift trucks.

Hysters are materials handling expediters that do an amazing amount of work—*save time and money*—release manpower for more productive jobs in factory, field or warehouse.

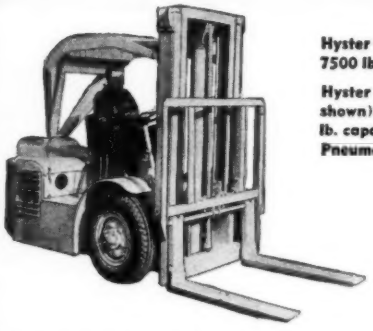
Hyster models range in capacity from 2000 lbs. to 30,000 lbs. All models are *pneumatic tired*, gasoline powered, engineered and built for fast, efficient, enduring service.

Illustrated literature sent gladly.

Hyster "20"
2000 lb. capacity
Pneumatic tires

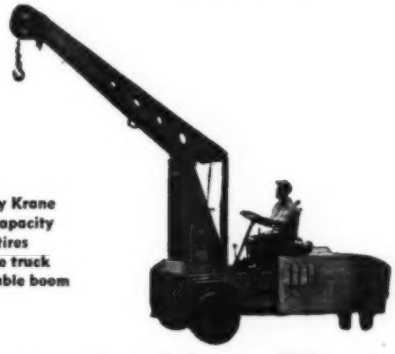


Hyster "40"
4000 lb. capacity
Pneumatic tires



Hyster "75"
7500 lb. capacity

Hyster "150" (not shown) has 15,000 lb. capacity
Pneumatic tires



Hyster Karry Krane
10,000 lb. capacity
Pneumatic tires
Mobile crane truck with adjustable boom

Hyster Straddle Truck "M"
12,000 lb. capacity

Model "MH" (not shown) has 30,000 lb. capacity
Pneumatic tires

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HYSTER

Sold and Serviced Through Distributors in Principal Cities All Over the World

WORLD'S LARGEST MANUFACTURER OF PNEUMATIC TIRE LIFT TRUCKS AND STRADDLE TRUCKS

NEW YORK SECTION, SOCIETY OF AMERICAN FORESTERS MEETS AT SARATOGA SPRINGS

The summer meeting of the New York Section, Society of American Foresters, was held at Saratoga Springs, New York, September 5. Headquarters for the meeting was the New Worden Hotel. The timely keynote of the session was the theme which centered about discussions concerning the growing, harvesting, and processing of pulpwood.

Field trips to mills and plantations in the vicinity of Saratoga Springs were taken by members of the association. At the International Paper Company plant at Corinth, operation of a new hydraulic barker which removes bark from logs by means of a high pressure steam jet was studied by the foresters. Visits to the West Virginia Pulp and Paper Company plant at Mechanicsville were made by the members; and methods and tools used in thinning a 22-year old pine plantation were observed at the Thomas Luther property, near Saratoga Springs.

E. F. McCarthy of the New York State College of Forestry (Syracuse University) was chairman of the meeting, and heading the program was Noble Harpp of the New York State Conservation Department.

◆

U. S. PACKAGING INSTITUTE TO EXCHANGE TECHNICAL DATA WITH GREAT BRITAIN'S PATRA

Consolidation of research facilities between two leading professional associations in Great Britain and The United States was announced recently. The directors of the Packaging Institute voted approval of the exchange of technical research data with the Printing and Allied Trades Research Association, London.

PATRA, the British organization, through its packaging division maintains laboratories and library facilities for the advancement of British technical studies in all phases of paper, metal, glass, and synthetic packaging materials.

The Packaging Institute, which comprises four hundred American and Canadian firms manufacturing packaging materials and machinery, includes a large number of package users in the food, drug, cosmetic, and pharmaceutical industries. The research activities of the Institute are carried on through the producers and users of packaging materials.

◆

THREE TAPPI MEETINGS

The meeting of the Technical Association of the Pulp and Paper Industry scheduled for September 26, 27 and 28 in Detroit, Michigan, is generally considered as the fall meeting. However, the meeting this year will be quite different from previous fall meetings in that the entire program is devoted to one broad subject —"The Present Status of Wood as a Raw Material for the Pulp and Paper Industry." This program has been arranged by Dr. Harry F. Lewis, chairman of the Fundamental Research Committee of TAPPI and dean of the Institute of Paper Chemistry. Dr. Lewis will be program chairman of the meeting. It is the belief of Dr. Lewis that the present time—period of transition from war to peace—provides an unusual opportunity for the industry to take stock of its resources and to review some of the trends that evidently will affect the future of industry. The Detroit meeting will be one of interest to those who try to plan ahead and need to know something about the significance of wood-using economics and technology.

Two other fall TAPPI meetings are scheduled. The Association's first national Engineering Conference will be held in Milwaukee, Wisconsin, October 2-4, at the Pfister Hotel. The general chairman of this meeting will be Edwin F. Burns, of the International Paper Company.

Another meeting, the second national meeting sponsored by the TAPPI Alkaline Pulping and Chemical Products Committee, will be held at the Roosevelt Hotel, New Orleans, Louisiana, October 14-16. W. F. Gillespie, Gaylord Container Corporation, will be general chairman. Co-chairmen will be R. H. Stevens of the National Container Corporation, and K. G. Chesley, of Crossett Lumber Company.

All of these three meetings have been planned around special themes. All are business and educational in character and given over to important topics. This new agenda of TAPPI fall meetings will extend the interest of the annual TAPPI meeting held in February and round out a program of educational and technical subjects.

◆

"M.I.M.A. NEWS" IS PUBLICATION INTRODUCED BY MAGNESIA ASSOCIATION

As part of its program to help solve the best insulation problems of industry, the Magnesia Insulation Manufacturers Association has just released the first issue of its new publication, the *M. I. M. A. News.*

M. I. M. A. News will be issued quarterly. Its purpose is to establish a helpful medium of contact between users of 85 per cent Magnesia Insulations and the manufacturers. The publication also will seek to bring helpful information about heat insulations to industrial users through articles describing unusual applications of the product, its contribution to economy and its aid to industrial efficiency by elimination of unnecessary heat waste.

◆

COMING EVENTS

Sept. 26-28—Fall meeting of the Technical Association of the Pulp and Paper Industry, Statler Hotel, Detroit, Mich.

Oct. 2-4—TAPPI Engineering Conference, Hotel Pfister, Milwaukee, Wis.

Oct. 4-5 — Pennsylvania - New Jersey - Delaware Divisions of The American Pulp and Paper Mill Superintendents Association, joint meeting, at the Abraham Lincoln Hotel, Reading, Pa.

Oct. 7—National Safety Congress, in Chicago, Headquarters and exhibits at Stevens Hotel. Meetings may be held in Stevens, Palmer House, and Congress Hotels.

Oct. 17-19 — National Paper Trade Ass'n Fall Convention, Edgewater Beach Hotel, Chicago.

Nov. 14-16 — Joint meeting Southern and Southeastern Divisions American Pulp and Paper Mill Superintendents Association, George Washington Hotel, Jacksonville, Fla.

Nov. 22-23 — Pacific Coast Division American Pulp and Paper Mill Superintendents Association, New Washington Hotel, Seattle, Wash.

Dec. 2-7—17th National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City.

STATED MEETINGS

Chicago Professional Paper Group meets the third Monday of each month at Chicago Bar Association, Chicago.

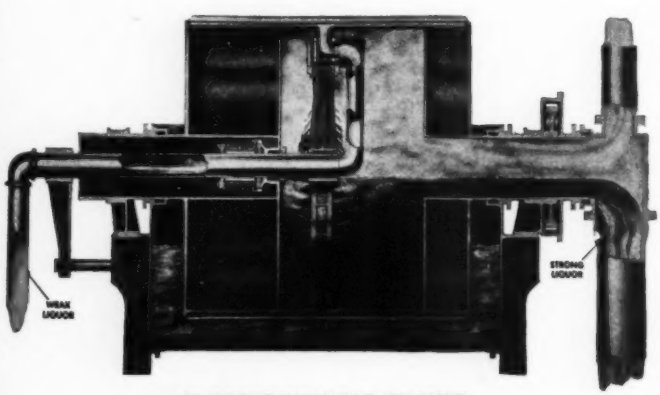
HARVESTING of Weyerhaeuser timber provides a continuous supply of pulpwood for West Coast Bleached Sulphite Pulp manufactured by the Pulp Division, Weyerhaeuser Timber Company

WEYERHAEUSER

The Message from 1400 Olivers

With the nearly eighty Oliver Ringvalve Filters, to say nothing of the other Olivers, installed during 1945 and early 1946, we have passed well beyond the 1400 mark of Oliver Filters purchased by the pulp and paper industry throughout the world. Most of these filters are still in service — some of them 15 to 20 years old. In considering this record, it will be of interest to note that the basic principle of continuous vacuum filtration, first applied by Oliver United to the paper industry's problems in 1921, is as sound today as ever. The filter design is better, of course, and, in the light of experience and changing requirements, has been developed along new lines to give even greater efficiency and durability.

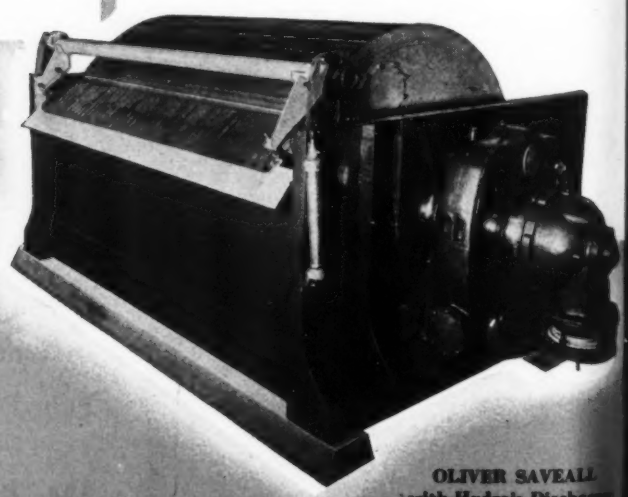
One of the most effective of the recent designs is the Oliver Ringvalve Filter which, for washing or thickening free stocks, is far superior to anything else. Oliver Savealls have several alternate methods for discharging the sheet, adding to the usefulness of these essential filters. And the Oliver Board Forming Machine is making an excellent record both as to capacity and to quality of board produced.



OLIVER RINGVALVE WASHER

For twenty-five years, Oliver United has contributed much to the progress made by pulp and paper mills. The 1946 Olivers would be excellent investments for companies desiring to enlarge their mills, modernize or build anew.

OLIVER GROUND WOOD WASHER
with Hydrair Discharger



OLIVER SAVEALL
with Hydrair Discharger

Pulp Filters—

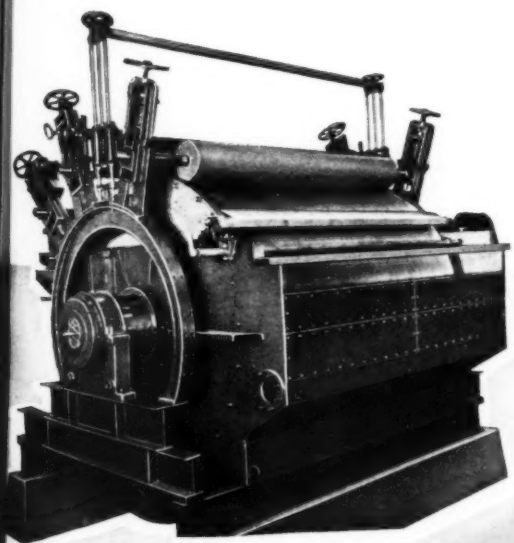
"You won't go wrong with an Oliver"

OLIVER Ringvalve High Density Thickener
OLIVER Ringvalve Sulphate Washer
OLIVER Ringvalve Sulphite Washer
OLIVER Ringvalve Bleach Washer
OLIVER Ringvalve Soda Washer
OLIVER Ringvalve Decker
OLIVER Ground Wood Decker and Washer
OLIVER Board Forming Machine
OLIVER High Density Thickener
OLIVER Lime Mud Filter
OLIVER Pulp Washer
OLIVER Saveall

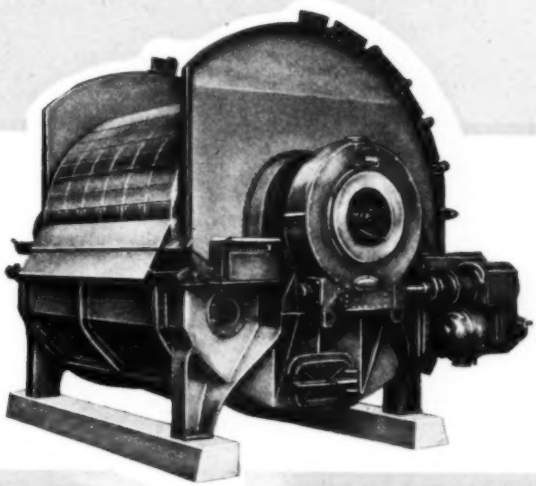
Folders . . .

Folders F106 and F109 outline the design and operating values of the Oliver Ringvalve Decker and Washer and of the Oliver Savealls. Send for copies.

OLIVER UNITED FILTERS INC.



OLIVER BOARD—FORMING MACHINE



OLIVER LIME MUD FILTER

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Western Sales Division
Oakland 1, California
2900 Glascock Street

Canada: Sales & Manufacturing Representative, E. Long Limited, Orillia, Canada

Factories: Oakland, Calif. - Hazleton, Pa. - Orillia, Canada - Melbourne, Australia

PULP AND PAPER INDUSTRY OF WASHINGTON STATE MEETS TO PLAN SAFETY PROGRAM

Ninety management and union labor delegates from the Washington state pulp and paper industry did some "collective safety planning" together at Olympia, Washington, August 2 and 3, when they tackled the broad subject of improving safety conditions, expanding safety education and first aid training on a coast-wise basis. State Department of Labor and Industries representatives attended the meeting as observers and expressed satisfaction that the pulp and paper group recognized a mutual problem and were tackling it co-operatively. Luis Alayza, in charge of all safety inspection for the government of Peru, was also an observer. He complimented the industry and its workers on recognizing their own problems and tackling them together.

Welcoming delegates, Earl Anderson, Director of Labor and Industries, emphasized the need for co-operative safety effort when he said "labor must do a better job of selling safety to its union members, I say that because the claims we process are not those of employers, but of employees."

"We must face the safety problem as students and scientists of safety, not as representatives of two groups, but as one, and we should co-operate as one," declared Otto Hartwig, Portland, Crown Zellerbach Corporation, one of the conference panel leaders.

Highlight of the meeting was an address by Alexander R. R. Heron, executive vice president of the Pacific Coast Association of Pulp and Paper Manufacturers, who said, "We're dealing here with a bigger job than World War II for the reason that in the United States more people are killed and injured in accidents annually than the whole nation sacrificed in the late war. We have plenty of laws, plenty of safety standards, but there is no law on the statute books that will restore a lost arm or a lost life, or make a workman work safely. That job is one for the human minds, and human hearts, and how we go about living with this safety responsibility every minute of every working day."

"Progressive management will not realize a cent of saving from a reduction in accidents," says Mr. Heron. "For actually, the dollar saved, together with an added dollar, will be ploughed back into the job of improving safety conditions and attitudes. Above wages, above call time, above vacations with pay, one of the best buying assets we have towards recruiting and getting co-operation of workers is one in which working conditions are morally, mentally, and physically safe."

"The conference is adding a new chapter in labor negotiations," said John Sherman, of Tacoma, vice president of the International Brotherhood of Pulp, Sulphite and Papermill Workers, who was a conference leader. Stressing that "one person is killed every five and one-half minutes and one person hurt every three seconds in the United States," Sherman said that he was gratified that the pulp and paper management and union workers are accepting this "new responsibility for a still further reduction in accident severity and frequency."

The two-day joint labor and management conference, attended by delegates of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, and the International Brotherhood of Papermakers, and the Pacific Coast Association of Pulp and Paper Manufacturers, was the first of three such conferences to be held on the Pacific Coast, and will cover thirty-three mills and about the same number of local union groups.

One delegate from each of the locals of the two international unions and one representative from each pulp and paper manufacturer in the state constituted the planning group, which threshed out in conferences, many mutual safety problems.

Speakers specifically urged the need for participation, better training of new employees, regular eye checkups for employees, a broader program of first aid and disciplinary action against habitual offenders. A resolution of the joint convention recommended the making of a safety film for the Washington state pulp and paper industry.

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▶▶▶ THE FIELD OF FIRE protection has been entered by the Mathieson Alkali Works with the production of both high and low pressure carbon dioxide equipment. Harry Ensminger has been appointed head of the fire protection department with headquarters in the New York office of the company. The engineering service to be offered by Mathieson in the fire protection field will include surveys of occupancies to determine fire protection requirements, plans for protection systems, and supervision of installation.

◆

W. R. SHIELDS AWARDED CERTIFICATE FOR SAFETY WORK WITH WARTIME ASA

The recent award of the Certificate of Appreciation to W. R. Shields, Safety Engineer for the Calco Chemical Division, American Cynamid Company, Bound Brook, New Jersey, and to other members of the War Committee of the American Standards Association, by the government, for their efforts in developing standards for the Army and Navy equipment and procedures, is a tribute to the splendid work of the industrial safety engineers and the National Safety Council.

No accurate record has been compiled covering the saving in lives in the nation's industrial plants through the efforts of the professional safety engineers. It is possible to judge in the chemical industry the reduction in the accident frequency rate which now places the chemical industry eleventh among the nation's thirty-nine major industries.

The Calco organization has stressed the importance of strict adherence to the methods and procedures developed by the safety engineering department in its plant operations. The co-operation of the working force of the plant has made it possible to report an accident frequency rate of 4.54 for the year 1945.

◆

SAFETY CONTEST SCORES

As announced in the last issue, final scores in the contest ended June 30th are not ready for publication. These will be given out at the Annual Safety Congress to be held in Chicago the week of October 7.

Watch this section for scores on the new contest which began July 1.

What MAKES IT DIFFERENT . .

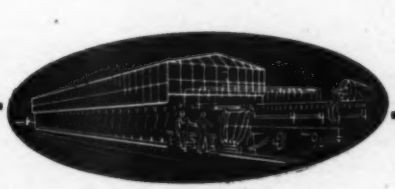
The high skill of workmanship which goes into Bagley & Sewall paper machinery is reflected in the excellent quality and high production records attained on Bagley equipment.

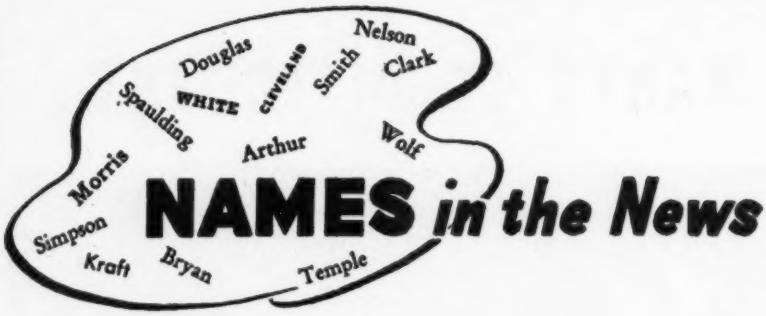
We invite you to consult us on your paper mill problems whether they are simple or complicated.

Our sales and engineering staffs will be glad to cooperate with you in solving your production problems whether they cover a complete machine or the reconditioning of your existing equipment.

BAGLEY & SEWALL

WATERTOWN, NEW YORK

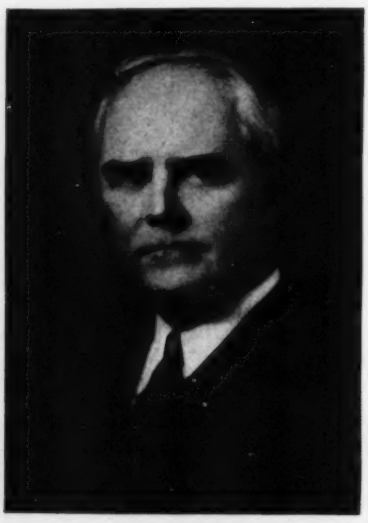




REUBEN B. ROBERTSON NEW PRESIDENT OF CHAMPION

At a meeting of the Board of Directors, held August 15, Reuben B. Robertson was elected president of The Champion Paper and Fibre Company, Hamilton, Ohio, to succeed the late Logan G. Thomson. Reuben B. Robertson, Jr., becomes executive vice president. Dwight J. Thomson, son of the late president, was elected a director and vice president.

Mr. Robertson has been associated with the Champion organization since 1907, at which time he was assigned to supervise the construction of the company's new southern pulp mill at Canton, North Carolina. Then after serving as general manager and vice president, Mr. Robertson became president of The Champion Fibre Company in 1925, serving in that capacity for ten years. He became executive vice president of The Champion Paper and Fibre Company when reorganization consolidated operations of the Hamilton and Canton mills.



Reuben B. Robertson

Under Mr. Robertson's direction, Champion has pioneered the development of many new methods in pulp and paper manufacture. It was Champion that led in the use of southern pine for the manufacture of strong white pulp, thus utilizing one of the South's great forest crops. This led to expanding company operations to the vast pine forests of lower Texas, and the building of a pulp mill at Houston in 1938. Later papermaking equipment was added at Houston.

Mr. Robertson is well known throughout the pulp and paper industry, and is president of the American Paper and Pulp Association. He also has been active in both national and state government affairs. As a member of North Carolina section of the Reconstruction Finance Corporation, Committee for Economic Development, the President's Labor Industry Conference, 1942, and Business Advisory Council Department of Commerce. As a member of the National War Labor Board, he organized its southern regional offices when the functions of that agency were being decentralized. In state affairs he has been a member of the North Carolina State Planning Board, chairman of North Carolina Wood Utilization Committee of the Department of Commerce, North Carolina Forestry Association.

For 25 years Mr. Robertson has been chairman of Southern Conference of Human Relations in Industry, and member of Southern Appalachian Research Council. He also has served on numerous civic organizations in Asheville and Canton, North Carolina.

Mr. Robertson was born in Cincinnati and attended the local grade schools and Walnut Hills High School. He graduated from Yale University, and then studied law in Cincinnati before being admitted to the bar in 1903. He has been a trustee of Western Carolina Teachers College and the University of North Carolina. He received an honorary D. Sc. degree from North Carolina State College in 1932.

▸▸▸ The contract engineer for The H. K. Ferguson Company, New York City, will be *Dave Wetherly*. During the construction of the atom bomb plant at Oak Ridge, Tennessee, Mr. Wetherly served in a supervisory capacity in the design and construction program. Prior to his work on the Oak Ridge project, he was associated with the Hercules Powder Company's Radford, Virginia, Ordnance Works, and Volunteer Ordnance Works at Chattanooga, Tennessee. Mr. Wetherly joined Ferguson last year and has been engaged in the design of distillery waste disposal plants.

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P. B. BORLEW ACCEPTS GOVERNMENT ASSIGNMENT

The assistant director of research for the Nekoosa-Edwards Paper Company's technical department, Peter B. Borlew, has accepted a temporary position with the chemical unit of the Technical Industrial Intelligence Division, Office of Technical Services, Department of Commerce (Washington, D. C.).

Mr. Borlew has been assistant director of research for the Nekoosa-Edwards organization since 1940. He left the company on August 17 for

P. B. Borlew

Washington and embarked immediately for Germany by airplane. His assignment abroad will be with the Field Information Agency, Technical, Office of Military Government for Germany.

In 1925, Mr. Borlew graduated from the Technical College and Institute of Cellulose Chemistry, Darmstadt, Germany. He did much of his undergraduate work in Russia and Poland and also studied at the Sorbonne and Conservatoire National des Arts et Metiers in Paris.

ARE YOU COMPELLED TO USE MORE AND MORE

SHORT FIBERS IN YOUR FURNISH? IF SO, THE

SUTHERLAND

continuous

BEATING AND REFINING

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CAN ASSIST YOU IN MAINTAINING QUALITY

SUTHERLAND REFINER CORPORATION

TRENTON, NEW JERSEY · *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL, P.Q., *Manufactured In Canada By The John Bertram & Sons Co. Ltd., Dundas, Ontario*

While in Paris, Mr. Borlew undertook research work for an American industrialist. For ten years after leaving Paris he did technical work for several German firms; and he has qualified himself through his foreign experience as an authority on patent rights of other nations as well as American.

Since coming to the United States Mr. Borlew has acted as consultant for paper and board converters and manufacturers. Prior to his association with Nekoosa-Edwards, he was employed by the Combined Locks Paper Company, Combined Locks, Wisconsin.

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▶▶▶ The new general superintendent of paper and board manufacture at the Champion Paper & Fibre Company, Canton, North Carolina, is *James E. Hall.* In his new position, Mr. Hall succeeds Harold E. Walker, who passed away last June.

◆

CHANGES AT DOWINGTOWN—STREET IS NEW PRESIDENT

Ellis Y. Brown, Jr., has resigned as president and treasurer of the Downingtown Manufacturing Company, Downingtown, Pennsylvania, for reasons of health, but he continues as a director and chairman of the executive committee. He has been associated with the company for 44 years in various executive capacities and has had the title of treasurer since 1903.

Edward T. Street is now president. He has been with the company for 17 years, first as chief engineer, which post he held until about a year ago, at which time he became vice president in charge of sales. With this background of experience, Mr. Street will naturally give special attention to sales and engineering.

Edward T. Street

Enright A. Ellis is now treasurer of the company, in addition to being vice president in charge of manufacturing, which position he has held since 1944. He has been with the company for 12 years.

Ellis Y. Brown, 3rd, a son of the retiring president, remains as secretary and is in charge of all purchasing. He has been with them since 1933.

◆

▶▶▶ The president of the Container Testing Laboratories, *E. A. Throckmorton,* has been elected chairman of the Packaging Institute's standing committee on trade standards and practices. Mr. Throckmorton was

E. A. Throckmorton

vice president in charge of development for the Container Corporation of America before his appointment as president of Container Laboratories last March. Previous to his election he has been a director of the Packaging Institute.

◆

FAIRBANKS, MORSE ADD TO R.R. DIVISION PERSONNEL

Following the rapid acceptance of the Fairbanks, Morse Diesel Locomotives, steps have been taken to expand the activities of its Railroad Division. Announcement has been made that additions to the personnel of the Railroad Division have been made in accordance with the expansion of the company's nation-wide activities in this field.

E. A. Foster has been appointed manager of the application engineering department of the Railroad Division and will make his headquarters in Chicago. Mr. Foster was formerly with the Electro-Motive Division of the General Motors Corporation.

J. F. Weiffenbach has been appointed chief engineer of the Railroad Division. Mr. Weiffenbach has been associated with the General Motors Electro-Motive Division for the past ten years. He was located at the LaGrange, Illinois, plant where he did locomotive engineering and designing.

Frank Ross, Jr., who has been assistant in the Railroad Division for the past year, will now act as sales engineer in charge of locomotive sales in the St. Louis area.

Frank M. Bosart has been appointed eastern manager of locomotive sales and will be located in the company's New York branch offices. Mr. Bosart joins Fairbanks from the Electro-Motive Division of General Motors.

Robert Aldag, Jr., has been appointed sales engineer for the Chicago district and will maintain headquarters in the Fairbanks, Morse Chicago office.

◆

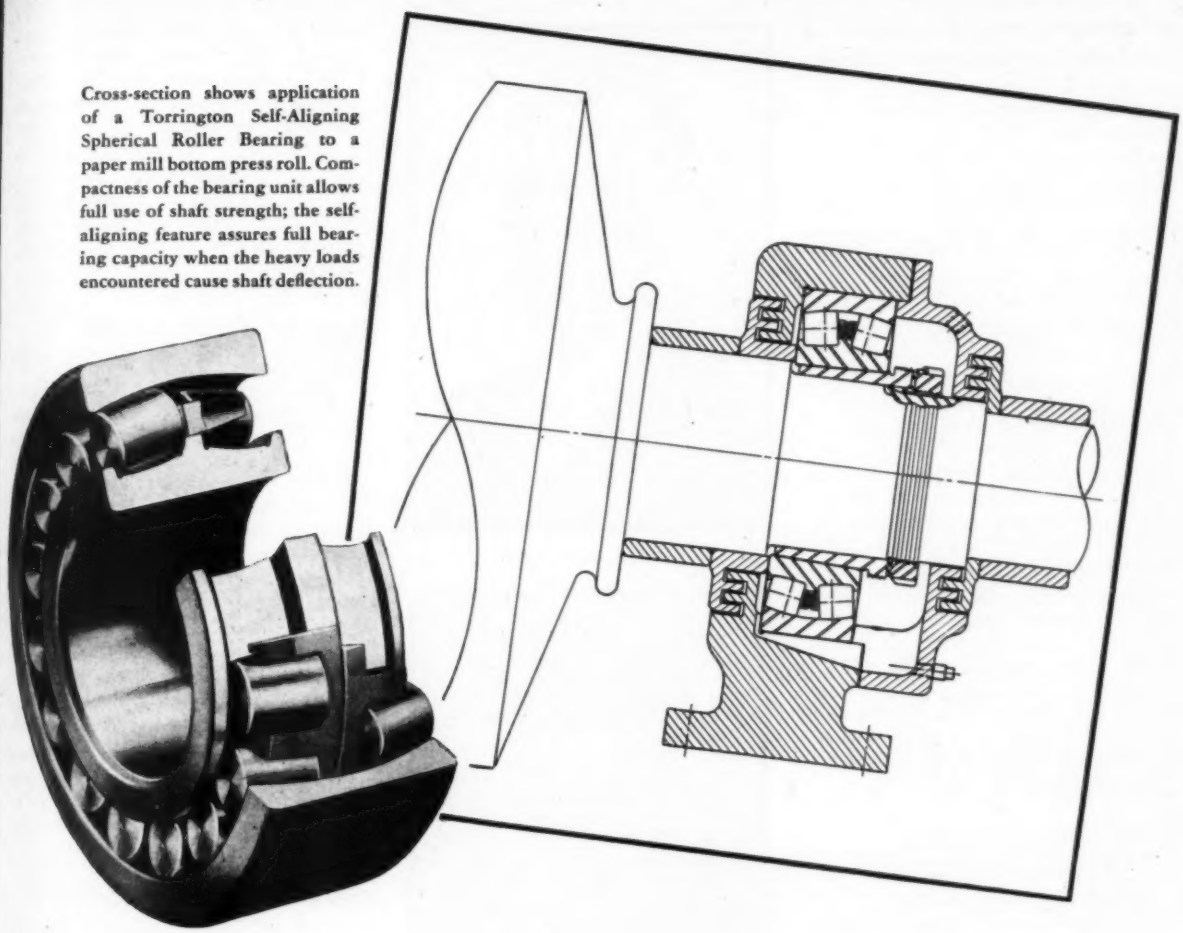
▶▶▶ The manager of the American Anode, Incorporated, plant which is under construction in Los Angeles will be *Robert A. Lees.* Construction will be completed and operation of this new Anode development will begin late this fall. The plant will manufacture latex compounds for all purposes. Mr. Lees, who has been production manager since 1935 for Anode, is well qualified to assume the duties for the West Coast operation.

◆

▶▶▶ After twenty-six months service with the Combat Engineers, *O. F. Hutchinson* has rejoined the Specialty Products Department of Bulkley, Dunton Pulp Company (New York) as sales and service representative.

O. F. Hutchinson

Cross-section shows application of a Torrington Self-Aligning Spherical Roller Bearing to a paper mill bottom press roll. Compactness of the bearing unit allows full use of shaft strength; the self-aligning feature assures full bearing capacity when the heavy loads encountered cause shaft deflection.



FOR MAXIMUM CAPACITY AT HIGH SPEED

Many heavy-duty machines in the paper industry operate under heavier loads and at greater speeds than ever before. With Torrington Self-Aligning Spherical Roller Bearings, such equipment performs efficiently at less cost in terms of power and maintenance.

The high radial and thrust capacity of Spherical Roller Bearings is unimpaired by shaft deflection under heavy loads. The self-aligning feature prevents internal binding, assuring smooth operation at full capacity under all conditions. Unit construction facilitates installation and servicing at infrequent maintenance periods. That's why they meet the many requirements on such paper machine applications as breast, wire, press rolls, press and dryer felt rolls, dryer cylinder and calenders as well as on such stock preparation equipment as Beaters, Jordans and Chippers.

Whether you design, manufacture or operate paper machinery, enlist the assistance of our engineering staff in adapting the spherical Roller Bearing to your requirements. For further information, write for our Bulletin No. 200 or see your nearest Torrington Representative.

THE TORRINGTON COMPANY
BANTAM BEARINGS DIVISION • SOUTH BEND 21, IND.

TORRINGTON BEARINGS

SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

WYANDOTTE RESEARCH HEAD MAKES SCANDINAVIAN TOUR

Among a group of American executives and scientists who made an eighteen day conducted tour of Sweden, Denmark, and Norway, Dr. Thomas H. Vaughn, director of research for the Wyandotte Chemicals Corporation, Wyandotte, Michigan, was the only chemical manufacturer representative. Other members of the inspecting tour represented the paper, glass, textile, rubber, radio, oil, steel, machinery, paint, and pharmaceutical industries.

The tour of inspection was sponsored by the Royal Swedish Academy of Engineering Research. During the visit made to the three Scandinavian countries, the representatives of American industry inspected educational research laboratories and manufacturing plants.

The purpose of the inspection tour was to stimulate a free flow of technological information between the United States and that section of Europe in which industry was unharmed by the war. By so stimulating technological exchange it is believed that an industrial beach-head can be made in Europe.

◆

W. K. METCALFE ELECTED SECRETARY OF J. O. ROSS

The election of W. K. Metcalfe as secretary of the J. O. Ross Corporation, New York City, was announced recently by the board of directors of the company. Mr. Metcalfe has been an engineering executive with the Ross organization for the past ten years.

In the pulp and paper and allied industries Mr. Metcalfe has gained considerable recognition for his work in designing and installing major lines of equipment in a number of prominent mills.

During the past ten years Mr. Metcalfe has presented papers before TAPPI, and the Superintendents Association, and other organizations devoted to technical improvements in the pulp and paper industry.

◆

CHESNUT TO HEAD NEW PACIFIC DIVISION OF WYANDOTTE CHEMICALS

Effective August 1, Charles O. Chesnut became general manager of the newly created Pacific Division of Wyandotte Chemicals Corporation, Wyandotte, Michigan. Manufacturing and distribution in the Pacific Coast states of the products of the J. B. Ford and Michigan Alkali Divisions of Wyandotte, and of the Natural Soda Products Company, will be directed by the Pacific Division office, Central Tower Building, San Francisco 3. The new division will also solicit business for the new Wyandotte specialties and chemicals.

Mr. Chesnut became president of the Natural Soda Products Company on the retirement of Stanley Pedder. The manufacturing operations of this company will be at Owens Lake, California.

Thomas H. Vaughn

W. K. Metcalfe

Charles O. Chesnut

◆

A. H. ANDERSON ELECTED PRESIDENT OF BIRD & SON

At a meeting of the board of directors of Bird & Son, Incorporated, East Walpole, Massachusetts, August 14, the announcement was made that Axel H. Anderson was elected president of the company. Mr. Anderson who has been secretary-treasurer of the company since 1930 succeeds Benjamin H. Roberts, who is retiring and will be vice chairman of the board and director of Bird & Son.

Mr. Anderson is also secretary-treasurer and director of the Bird Machine Company, South Walpole, Massachusetts, and of the Berry Asphalt Company of Chicago.

Bird & Son is engaged in the manufacture of paper, paper products, building and roofing materials, and floor coverings.

◆

JOHN D. RUE MADE MGR. HOOKER TACOMA PLANT

The appointment of John D. Rue as works manager of its Tacoma (Wash.) plant has been announced by Hooker Electrochemical Company, Niagara Falls, New York.

Mr. Rue is widely known as an authority on the use of chemicals in the manufacture and bleaching of pulp and paper. He has been associated with the Hooker company since 1931. Prior to that time, he was in charge of the Pulp and Paper Section of the U. S. Forest Products laboratory at Madison, Wisconsin.

At the Hooker Niagara Falls plant, Mr. Rue was engaged in sales service, particularly for the pulp and paper industry. Since 1942, he has been associated with the engineering department as executive assistant to the chief engineer.

◆

▶▶▶ The southern representative for the Heller & Merz Department of the Calco Chemical Division, American Cyanamid Company (Bound Brook, New Jersey), will be *W. M. Boyce*. Mr. Boyce will contact the paper and gasoline refining industries to present Calco's developments in those industrial fields.

HIGHER operating speeds . . . increased pressure in the stacks . . . greater paper widths . . . heavier coatings . . . these are some of today's trends in the finishing room that modern superfinishing equipment must meet . . . APPLETON SUPERCALENDERS are engineered to keep finishing capacity in line with high-speed paper machine production . . . The incorporation of the latest mechanical and electrical advancements along with other refinements insures the dependability and precision that eliminates unnecessary down-time . . .

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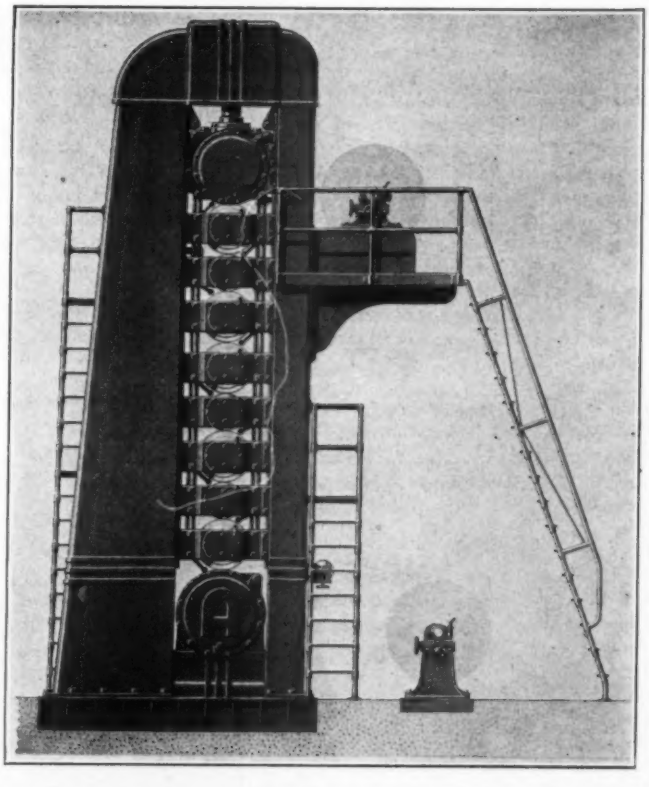
APPLETON SUPERCALENDERS are built for all standard and any special supering application, for all grades of paper and all degrees of finish. They cover all of the superfinishing requirements in the paper industry, from small three and five roll models for the laboratory up to huge stacks that finish full machine widths of machine coated paper.

APPLETON SUPERCALENDER ROLLS are furnished in the full range of resilience from soft to hard. We developed this complete selection of filled roll types in cooperation with paper manufacturers to provide the right finishing surface for each paper stock. Let our Sales Engineers show you how rolls built to fit your paper can give better finishing results.



THE APPLETON MACHINE COMPANY

APPLETON • WISCONSIN • *Eastern Sales Representatives: CASTLE & OVERTON, Inc., 630 Fifth Avenue, New York*

▶▶▶ Announcement has been made by Infilco, Incorporated, (Chicago) that *A. A. Kalinske* will be chief hydraulic engineer for the company. Mr. Kalinske is a specialist in the

A. A. Kalinske

field of hydraulic engineering having been an associate professor and associate director of the Institute of Hydraulic Research at the University of Iowa, as well as a consultant in the field.

◆

▶▶▶ Announcement has been made by The Timken Roller Bearing Company, Canton, Ohio, that *R. E. Wagenhals*, formerly quality control engineer, has been appointed director of quality control. Three district sales engineers have been appointed by The Steel and Tube Division of Timken to take charge of sales in New York, Chicago, and Cleveland. *Sherman R. Lyle*, *William T. Bryden*, and *Alfred J. Kinnucan* have assumed their new capacities in the respective offices of the company.

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▶▶▶ After thirty-five years with the National Adhesive Division of National Starch Products, Incorporated (New York City), *Albert C. Funk* has retired from active business life.

◆

▶▶▶ Thirty-four employees of Joseph T. Ryerson and Son, Incorporated, Chicago, who have a combined service record of 1,094 years have retired. During the war years many of those eligible for retirement remained on the job due to the manpower shortage. Among those employees retiring is *William H. Basse* who came with Ryerson in 1900 and who has gained a position of responsibility with the sales division of the company.

▶▶▶ Elected to the newly created position of controller for the Imperial Paper and Color Corporation, Glens Falls, New York, *William B. Plate*, assumed his duties early this month. At the time of his election to the position of controller, Mr. Plate was also named to succeed the late Daniel H. Cowles on the board of directors of the corporation.

◆

▶▶▶ Head of the construction division of the Graver Tank & Manufacturing Company, Incorporated (East Chicago, Indiana), is *Edward B. Heyden*, who has been associated with The Lummus Company for many years. *John E. Fogarty* has been appointed general manager of the Sand Springs, Oklahoma, plant of Graver. Mr. Fogarty, in the past, has been manager of the weldment division at the main plant of the company.

◆

▶▶▶ The assistant director of technical development for the St. Regis Paper Company of New York will be *F. Ray Linda*. In his new capacity, Mr. Linda will assist *Carl H. Hartman*, director of technical development and vice president of St. Regis. Mr. Linda is widely known in the paper industry in the fields of sales engineering and sales development work. His work in connection with bag-filling and closing equipment, and in development of variations in bag construction and closures is especially well known.

◆

▶▶▶ Formerly national treasurer of the Association of Power Engineers, *H. J. Harp* has joined The Permutit Company as sales engineer of internal feed water treatment and will work in the Philadelphia area.

H. J. Harp

▶▶▶ New manager of the Eastern Industrial Lift Truck Division of Hyster Company (Portland, Ore.; Peoria, Ill.; and Danville, Ill.) is *Clarence H. Collier, Jr.* Mr. Collier, in

Clarence H. Collier, Jr.

engineer by profession and with Hyster for a number of years, is well known in the materials handling industry. He will have his headquarters in Peoria.

◆

▶▶▶ The former plant manager for Container Corporation of America at Manayunk, and more recently vice president and production manager for American Coating Mills at Elkhart, Indiana, *B. M. Thomas* has joined the production department of Ohio Boxboard Company, Rittman, Ohio.

◆

▶▶▶ Announcement has been made by the American Car and Foundry Company, New York City, that *R. S. Slater* has been appointed manager of tank car sales. In this capacity he will be in charge of sales of tank cars, storage tanks, and pressure vessels. Mr. Slater will continue to make his headquarters in New York.

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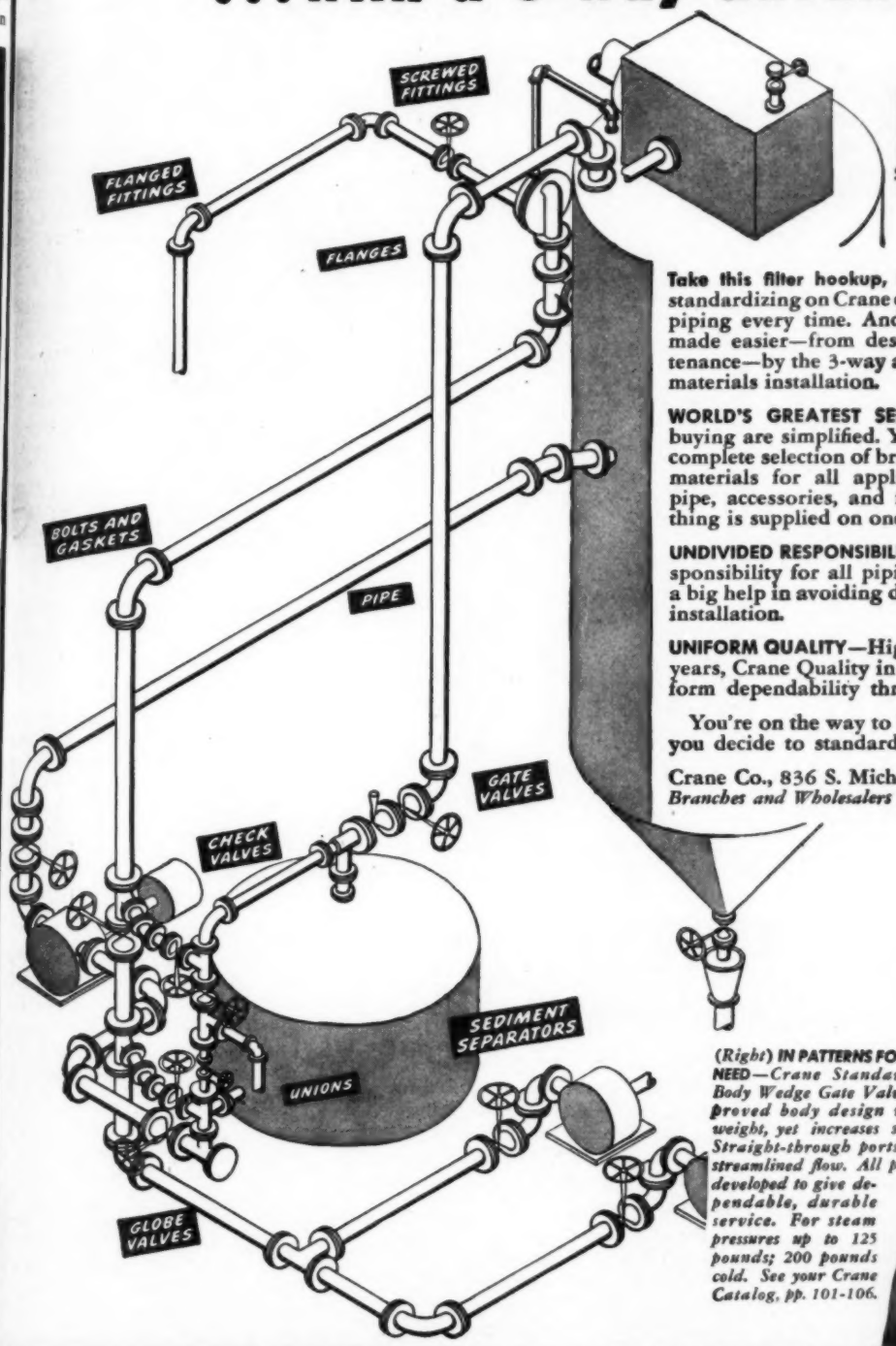
▶▶▶ Recently released from the Navy Air Force, *John M. Davidson* has joined the sales staff of the Pennsylvania Salt Manufacturing Company, Philadelphia, in the special chemicals division.

◆

▶▶▶ Appointment of *F. Faxon Ogden* as manager of special products sales development for the Monsanto Chemical Company's Merrimac Division has been announced. Also, the appointment of *J. J. McCarthy* as manager of chemical sales development in charge of new products for the paper and leather industry has been announced.

The ONE way to better piping ...with a 3-way advantage



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DR. W. J. FOOTE NAMED MANAGER OF WIS. RIVER DIV. OF CONSOLIDATED

Dr. W. J. Foote, a member of the technical staff of the Consolidated Water Power and Paper Company (Wisconsin Rapids, Wisconsin), has been appointed manager of the company's Wisconsin River Division near Stevens Point, Wisconsin. Before it was acquired by Consolidated the Division was the Wisconsin River Pulp and Paper Company, used for the manufacture of newsprint. The mill now is converted to the production of coated papers.

Dr. Foote is a graduate of the Institute of Paper Chemistry at Appleton, Wisconsin, and has been associated with Consolidated since 1938 as a technical staff member. In his new position he will succeed the late C. R. Morse.

◆

▶▶▶ Newly appointed sales manager of the Export Department, Hercules Powder Company, Wilmington, Delaware, *William A. Cahall,* is in Honolulu on the first leg of an eight months trip to the Far East and South America. Mr. Cahall will reestablish distribution outlets for Hercules products, visit company customers, determine potential product outlets, and appoint distributors for some of Hercules newer products, especially toxic agents for insecticides, and synthetic resins which were not exported extensively in prewar days.

◆

▶▶▶ After twenty-eight years of selling for International Printing Ink, Division of Interchemical Corporation, New York, *Harry B. Taylor* will retire from active sales participation. In the future he will devote his activities to work as a consultant and technical adviser for IPI.

◆

▶▶▶ Following his resignation from the Consulting Division of W. H. & L. D. Betz, Philadelphia, Pennsylvania, *Lewis B. Miller* has accepted a position as associate professor of chemical engineering at the University of Cincinnati (Cincinnati, Ohio).

◆

▶▶▶ Newly elected officers of the Lakeview Supervisor's Club of the Kimberly-Clark Corporation's Lakeview mill are: *Claude Brady,* president, *Arthur Homblett,* vice president, *Ervin Winters,* secretary, and *Herman Krause,* treasurer,

◆

▶▶▶ The Coshocton, Ohio, plant of the General Electric Plastics Divisions which is now under construction will be managed by *Guy. M. Stone.*

▶▶▶ At the annual meeting of the board of directors of the Brown Company, Berlin, New Hampshire, the present officers were re-elected: *Frederick G. Coburn,* president, *E. H. Maling,* vice president and treasurer, and *John W. Jordan,* secretary. A new officer, *Wentworth Brown,* was elected vice president in charge of manufacturing.

◆

▶▶▶ Formerly manager of the Power Transmission Division of Ideal Industries, Incorporated, *Walter B. Briggs,* has been appointed general manager

Walter B. Briggs

of the Power Transmission Division of Lovejoy Flexible Coupling Company, Chicago.

◆

▶▶▶ Appointment of *Douglas L. Darnell* as vice president in charge of sales for the Baker-Raulang Company, Cleveland, Ohio, has been announced.

◆

▶▶▶ The former executive vice president of the Eaton Paper Corporation, Pittsfield, Massachusetts, *Paul E. Burbank* has been named manager of cargo sales for United Air Lines.

◆

▶▶▶ Former eastern sales manager of the Crosley Corporation, Cincinnati, *Sherman A. Bishop* has joined the Trimz Company, Incorporated, a division of United Wallpaper, Incorporated, as assistant sales manager with headquarters in New York. *James H. Rasmussen,* vice president in charge of sales and merchandising, will assume the additional duties of executive vice president of Trimz. *Herman Haas,* formerly assistant sales manager for the Crosley Corporation, has been named vice president and general sales manager for Trimz.

ALLIS-CHALMERS MAKES PERSONNEL TRANSFERS FOREIGN & DOMESTIC

Export representative for the Allis-Chalmers Manufacturing Company, Milwaukee, in the Philippine Islands will be Warren J. Holmes. He will work with the Earnshaw Docks and Honolulu Iron Works, distributors for A-C general machinery division.

Richard F. Muller has been named manager to the New Orleans district office to succeed F. W. Stevens who is retiring after forty-one years of service.

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▶▶▶ The newly appointed Buffalo branch manager for International Printing Ink Division of Interchemical Corporation will be *Thomas J. Reese, Jr.* He succeeds his father, Thomas J. Reese, Sr. in the administration of the Buffalo office.

◆

▶▶▶ The recent appointment of *I. B. Anderson* as manager of the Stainless Steel Division of the Jessop Steel Company, Washington, Pennsylvania, has been announced. Mr. Anderson has been associated with the steel industry for twenty years.

◆

▶▶▶ Manager of the Control Division of the Rayon Department of the DuPont Company, *Clayton M. Albright* has retired after forty-three years service. Mr. Albright will be succeeded to the position of manager of the Control Division by *M. W. Touchton* who has been assistant manager of the division.

◆

▶▶▶ Assistant vice president of the American Car and Foundry Company is *J. L. Onderdonk.* The announcement of Mr. Onderdonk's appointment to the vice presidency was made recently. He will continue to make his headquarters at the Chicago Office of the company.

◆

▶▶▶ Administrative assistant to *C. F. Dinley, Sr.,* vice president in charge of research and engineering for the Detrex Corporation, Detroit Michigan, will be *William L. McCracken.* He will provide both administrative and technical assistance in research and product development for all the company's products.

◆

▶▶▶ Consulting metallurgist for the Alloy Steel Products Company, Linden, New Jersey, will be *Emil C. Holmberg,* who for several years has been research metallurgist for the Belle, West Virginia, plant of the E. I. duPont deNemours Company.

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AVAILABLE ONLY THROUGH MODERN SHOP FABRICATION

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The illustration shows how a welding operation on 14" high pressure, high temperature piping is performed. The area adjacent to the weld is induction preheated to a temperature of 500°F. min. This temperature is accurately maintained during the entire electric arc-welding operation by means of indicating and control instruments. When the weld is finished, stress-relieving is accomplished by similar procedure.

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Heights State Bank Bldg., Houston
Whitehead Building, Atlanta

NEW POSTS ASSIGNED RESEARCH STAFF OF HERCULES PMC DEPT.

Four members of the research staff of the Hercules Powder Company's Paper Makers Chemical Department have been assigned new functions.

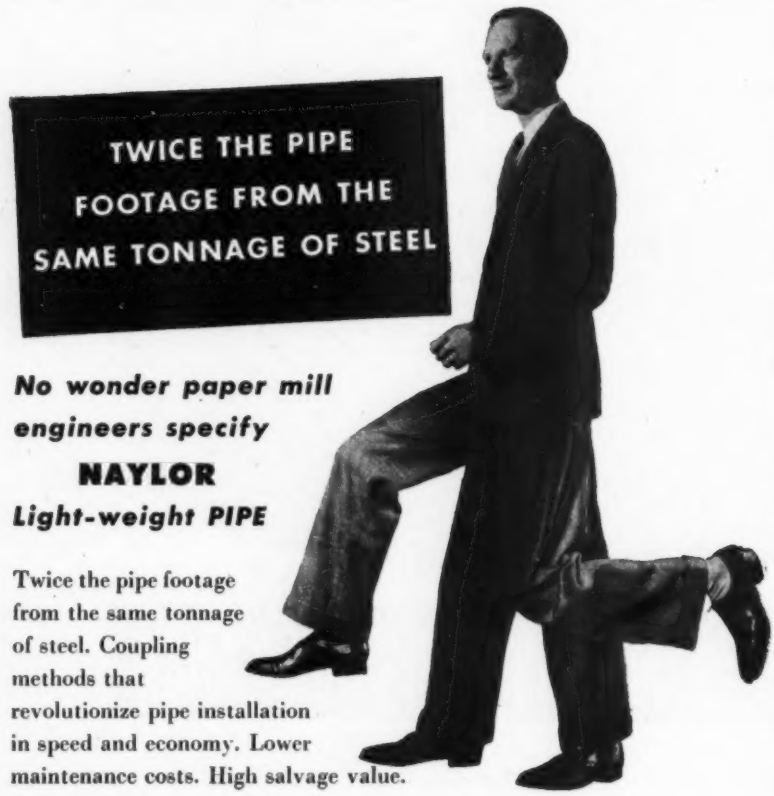
Dr. William P. Campbell, leader of the PMC research group at the Experimental Station near Wilmington, Delaware, has been appointed director of development of the PMC Department and will make his headquarters in the Wilmington home office.

Dr. W. Donald Thompson, Jr., formerly assistant group leader, has been named acting group leader at the Experimental Station.

Research chemists, Dr. James W. Davis and Dr. Sterns Putnam have been appointed assistant group leaders of the PMC Department. Dr. Putnam was formerly engaged in general research work, while Dr. Davis has been directly engaged in paper-making chemical research.

◆

▶▶▶ The new chief engineer for the recently established Industrial Pump Division of Bowser, Incorporated, *E. W. Chapman*, will make his headquarters in Fort Wayne, Indiana.



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RALPH R. NEWQUIST ELECTED VICE PRESIDENT OF SALES FOR ROOTS-CONNERSVILLE

The recent election of Ralph R. Newquist as vice president in charge of sales for the Roots-Connersville Blower Corporation, one of the Dresser Industries, has been announced.

Mr. Newquist has been successively employed by the Reliance Electric and Engineering Company, the Louis Allis Company, and the Allis-Chalmers Manufacturing Company, since graduating from Pennsylvania State College.

◆

▶▶▶ The president of the Pennsylvania Salt Manufacturing Company, Philadelphia, *Leonard T. Beale* and assistant to the president, *Richard L. Davies* have received the King Christian X Medal of Liberation from King Christian X of Denmark for their efforts in aiding the Danish cause during the years of Nazi occupation.

◆

S. B. BUGGE RESIGNS FROM TOMAHAWK KRAFT— McLAREN NEW† GEN. MGR.

After an association with the Tomahawk Kraft Paper Company which dates to 1923, S. B. Bugge, chairman of the board and general manager, resigned August 15. The announcement of Mr. Bugge's resignation was made by H. L. Fitze, secretary and treasurer of the Tomahawk Company. C. G. McLaren, who has been vice president in charge of wood procurement and woods operations for the past fifteen years, will replace Mr. Bugge in the position of general manager.

In 1925 Mr. Bugge was elected vice president and general manager of the firm, subsequently becoming president. Following the annexation of the controlling interest of the company by the National Container Corporation of New York (cf. P. I. and P. W., May 1946), Mr. Bugge was elected to the board of directors at a special meeting held at Wausau, Wisconsin, June 4. He continued in the position of general manager which he had held previously, and he was re-elected to both positions at the company's regular directors meeting on July 16. Mr. Bugge has indicated no definite outline of future plans, but will take a much needed rest at his home in Tomahawk, Wisconsin.

Mr. Bugge's association with the paper industry dates to the early years of this century. He was mill engineer for the Brompton Pulp and Paper Company, East Angus, Quebec, and from 1910 to 1923 he served as engineer and assistant manager of the

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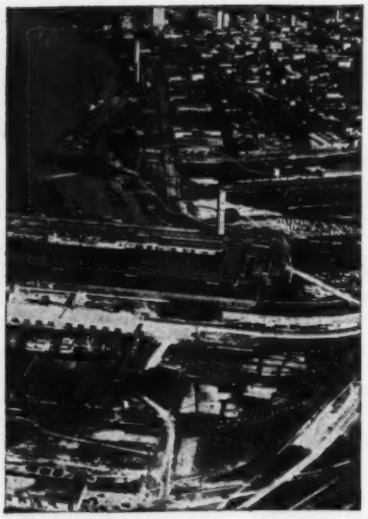

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Layne Vertical Turbine pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves hundreds of dollars on power cost per year.

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LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

Mosinee Paper Mills Company at Mosinee, Wisconsin. Mr. Bugge has designed, constructed and put in operation several mills in this country and Canada.

C. G. McLaren, the new general manager of the Tomahawk Company, became associated with the firm in 1927. He supervised the study and development of forest areas which were procured by the company for their supply of pulpwood.

Mr. McLaren is a forestry expert having graduated from the University of Iowa. He was elected to the vice presidency of Tomahawk at the Wausau meeting in June and re-elected to the position at the July meeting. For several years he has been a director of the company.

NECROLOGY

LOGAN G. THOMSON

The president of The Champion Paper and Fibre Company (Hamilton, Ohio), Logan Gamble Thomson, passed away while vacationing in La Jolla, California.

Mr. Thomson was born in Cincinnati, in 1884, the youngest of five children of Peter G. Thomson, the founder of Champion. He has been a life long resident of Cincinnati, and prominent there in civic affairs.

Forty-one years ago Mr. Thomson entered his father's business starting as a laborer in the mill. From various plant jobs he gained a thorough knowledge of the papermaking industry.

Logan G. Thompson

He developed, as well, a sympathetic interest in the welfare of his fellow employees which has manifest itself in all the company's policy in relationship with thousands of employees.

Mr. Thomson attended Williams College, and during World War I served as a Captain. He has held successively positions as manager of Champion's New York sales office, assistant production manager, director of the company in 1916, secretary-treasurer in 1920, first vice president in 1931, and in 1935 he succeeded his brother, Alexander Thomson, Sr., to the presidency of the company.

For many years Mr. Thomson has been recognized as one of the country's leading industrialists.

Surviving Mr. Thomson are his widow, a son, Dwight J. Thomson, and a daughter.

◆

▶▶▶ Chairman of the board of directors of the Graham Paper Company, St. Louis, Missouri, *Charles W. Lewis*, passed away August 7, in a hospital at Petoskey, Michigan. He had been vacationing at his summer home at Walloon Lake, Michigan. Mr. Lewis had 45 years service with the Graham organization.

◆

▶▶▶ Heating engineer for Crane & Company, Dalton, Massachusetts, *Charles Henry Watkins*, passed away at his home on August 3. Mr. Watkins had retired from his position with Crane two years ago.

◆

SHELDON D. BROOKS

On September 3, the chairman of the board of Powell River Company, Limited, Powell River, British Columbia, passed away at Victoria.

Sheldon Dwight Brooks was the son of Dr. Dwight F. Brooks, founder of the Powell River Company. He was 67 years of age.

Surviving Mr. Brooks are his widow and four children. One of two surviving brothers, Edward Brooks, of Minneapolis, is a director of the Powell River Company.

◆

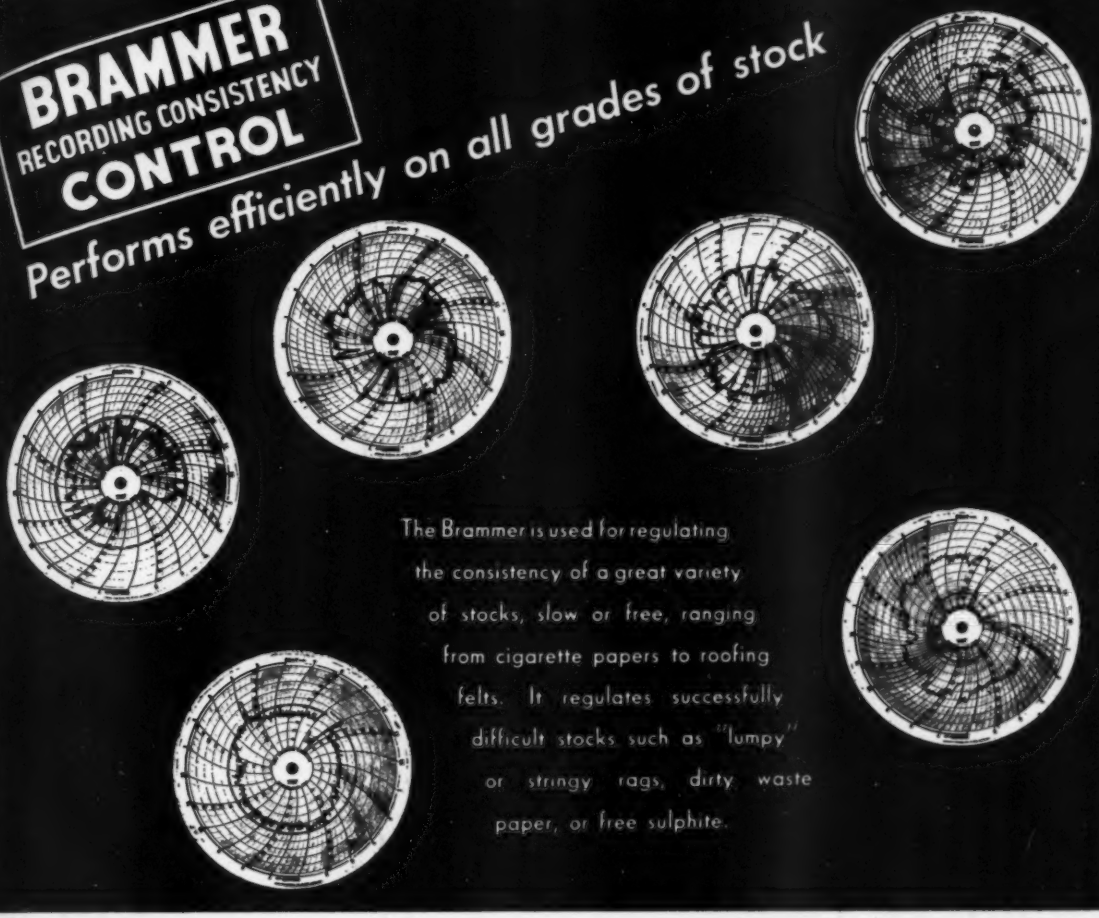
▶▶▶ Master mechanic for the Kimberly-Clark Corporation at Kimberly, Wisconsin, *Carl E. Nelson*, passed away August 17. He is survived by two sons, one daughter, three sisters, and six brothers.

◆

▶▶▶ A native of Belfast, Ireland, and a citizen of this country for several years, *Ernest A. Newman*, superintendent of the Crossett Paper Mills at Crossett, Arkansas, passed away August 8, in Shreveport, Louisiana.

BRAMMER RECORDING CONSISTENCY CONTROL

Performs efficiently on all grades of stock



The Brammer is used for regulating the consistency of a great variety of stocks, slow or free, ranging from cigarette papers to roofing felts. It regulates successfully difficult stocks such as "lumpy" or stringy rags, dirty waste paper, or free sulphite.

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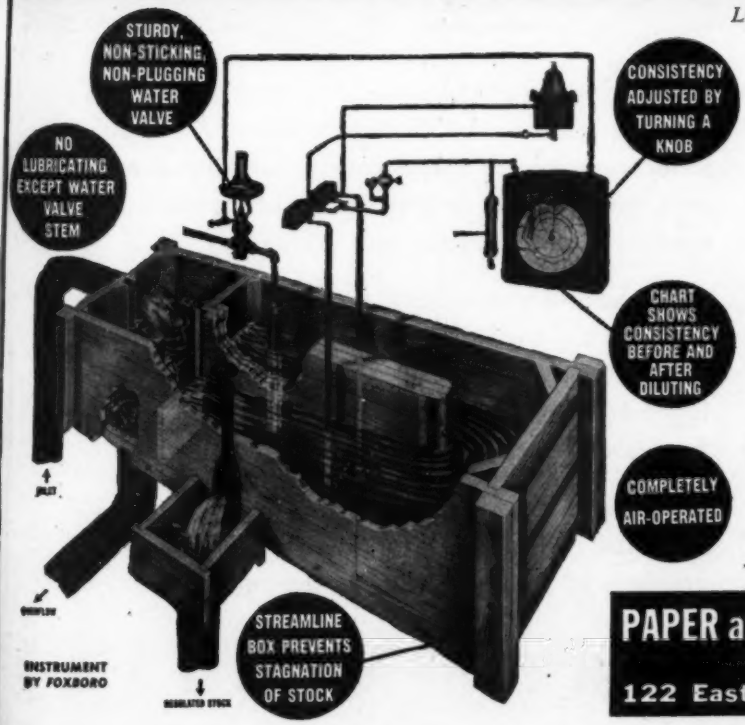
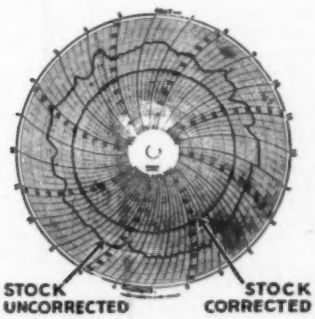

STURDY, NON-STICKING, NON-PLUGGING WATER VALVE
NO LUBRICATING EXCEPT WATER VALVE STEM
CONSISTENCY ADJUSTED BY TURNING A KNOB
CHART SHOWS CONSISTENCY BEFORE AND AFTER DILUTING
COMPLETELY AIR-OPERATED
STREAMLINE BOX PREVENTS STAGNATION OF STOCK
INSTRUMENT BY FOXBORO



24-hour record chart, showing consistency before and after diluting water has been supplied

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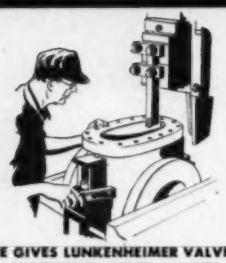
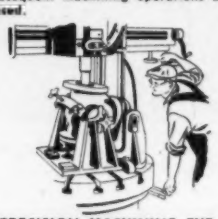
ASSURES PERFECT-FITTING INTERCHANGEABLE PARTS . . . LONGER VALVE LIFE . . . EASIER, LOWER-COST MAINTENANCE

I. B. B. M.
GATE VALVE
Fig. 1430



HE GIVES LUNKENHEIMER VALVES SOMETHING OTHER VALVES HAVEN'T GOT

He machines body guides down to precision tolerances, assuring a perfect guide for the disc and creating a positive center line on which all subsequent machining operations are based.



PRECISION MACHINING THE BODY FOR SEAT RINGS

is precision work to the "nth" degree, for this operation makes inserting the seat rings in a Lunkenheimer gate valve simply a matter of screwing them into position. Parts can be replaced without any machine work or special fitting.

- The smooth-working efficiency and low maintenance cost of Lunkenheimer Valves were not "made in a day". Behind this superior performance and economy lies long experience, and an ideal of precision which guides every operation from design to final assembly.

Lunkenheimer Valves have a streamlined simplicity of design . . . a minimum of working parts, each part of extra strength, correctly proportioned and perfectly balanced. This assures longer life with the least trouble and maintenance expense.

A Lunkenheimer Distributor is located near you, equipped and ready at all times to help you solve problems of maintenance or operation.

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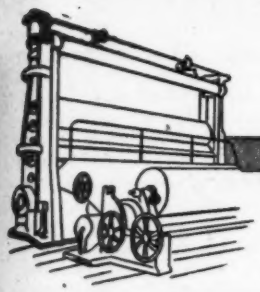
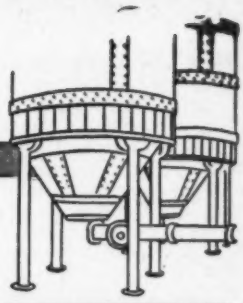
Bronze, Iron, Steel and Corrosion Resistant Alloy Valves, 125 to 2500 Lb. S.P.; Boiler Mountings, Lubricating Devices, Aircraft Fittings

LUNKENHEIMER VALVES



Practical SHORTS



Readers are invited to submit short, practical articles for this department The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Soldering Large-Diameter, Copper-Pipe Joints

Procedure for soldering large-diameter, copper-pipe joints is essentially the same as for smaller sizes except that more than ordinary care should be exercised in soldering fittings 2½ in. and larger. Thorough cleaning of both the surface of the tube to be soldered and the inside of the fittings is essential, and both should be thoroughly fluxed.

The heat should be evenly distributed around the entire circumference of the fitting, and care should be taken to play the flame on the fitting and not on the tube, to avoid any unnecessary annealing of the tube. The torch should be kept moving and not concentrated on one spot

For assembling lines 3 in. and over, it may be necessary to use two or more torches and solder should then be applied simultaneoously at two or more points. When using more than one torch, the flames should be played at opposite points on the fittings, and kept moving in such a manner that no point on the fitting will become overheated. When the fitting is sufficiently heated to melt the solder to the proper consistency, solder should be applied at opposite points and worked along the juncture of the fitting and tube so that even capillary distribution is assured.

Quart size gasoline-blow torches are commonly used for making solder joints. but a Prest-O-Lite torch or other air-acetylene equipment can be used and is more efficient when working in a confined space. In soldering large diameter joints a tip producing a wide flame should be used.—THE AMERICAN BRASS COMPANY.

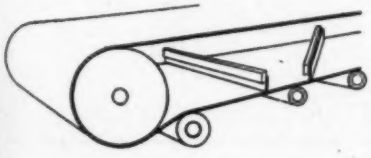
◆

Suggestions for Conveyor Belting Maintenance

Pull belting as tight as possible during installation. The first few days of operation will work out practically all inelastic stretch. The tighter the belting is pulled to begin with, the less take-up will be necessary later on.

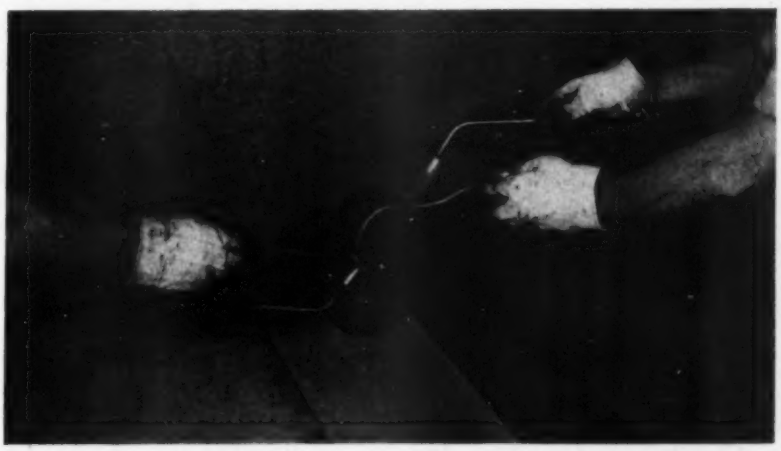
If slippage occurs, it can frequently be corrected by take-up adjustment. Pulley lagging will also eliminate slippage to a large degree.

Accumulation of foreign matter on the undersurface of conveyor belts can be eliminated by the use of a scraper on the return side of the head pulley as shown in the accompanying diagram. These scrapers also protect the belt from falling objects and rough handling that may tear the conveyor and permit moisture to enter the plies.



If belts do not run true, inspect troughing idlers for alignment and install training idlers at intervals of thirty to fifty feet as illustrated.

Fasteners should always grip belt tightly and should be inspected regularly. Loose fasteners should be promptly tightened and, at the first indication of weakness, should be replaced.—HEWITT-ROBINS, INC.



Making solder joint in 4-in. copper tube line with cast bronze elbow

◆

Good Housekeeping Factors

Good housekeeping is orderliness. It requires that there is "a place for everything, and everything is in its place."

Things are in place when tools are kept clean and correctly stored; when piles of miscellaneous materials and parts are securely blocked or lashed; when working areas are free of debris and unused material so that easy access is possible to operating units, fire extinguishers and first aid equipment; when there are no obstructions to the free use of stairways, platforms, entrances and exits.

Other factors which contribute to good housekeeping include: proper and sufficient lighting, both overhead and at workplaces; adequate ventilation to eliminate noxious or poisonous fumes; contrasting paint colors to identify valves, controls, guards, hand rails, and stair treads.

Small materials should be kept in boxes or kegs; heavy materials should be stored in low bins or shelf levels; light materials may be safely stored at higher levels. Tools, bottles, bolts and nuts left in high and out-of-the-way places may be blown by the wind, vibrated or kicked free. When such material is dislodged, it often makes for accidents.

Bridges, underpasses and stairways should always be kept clear and unobstructed. Otherwise, employees tend to take short cuts and walk over moving machinery and conveyors. Good housekeeping, through proper supervision, overcomes these bad practices which many times results in costly accidents.—THE FOREMAN'S LETTER, July 3, 1946.

◆

Play Safe With Organic Solvents

The sense of smell can be a helpful safety aid in operations involving organic solvents.

A strong odor of solvent in the workroom is a danger signal; it usually means a high concentration of solvent vapors in the air. Workers should, therefore, be trained to report promptly a sudden rise in solvent odors, or a smarting of the eyes and nasal passages. These are indications that something has "gone wrong," so that excessive amounts of vapor are escaping. Breathing such amounts of solvent vapors may cause

serious illness. Moreover, many organic solvents are flammable, so that a high concentration of vapor in the air may be a dangerous fire hazard.

Because organic solvent vapors may be both a health and fire hazard, solvent-using operations should be carefully controlled, so that the concentration of vapor in the atmosphere is kept to a minimum. Operations may be entirely enclosed, so that no vapor escapes; they may be provided with adequate ventilation, to remove vapors from the atmosphere; or, in certain instances, the worker may be equipped with approved respirators or gas masks.

It is inadvisable, of course, to rely upon the sense of smell as a proof of safety. Odors may not be noticed by men very accustomed to them; sometimes other odors may mask the solvent vapor; also, an atmosphere in which the solvent odor is only barely perceptible may still be unsafe. For these reasons, a periodic analysis of the workroom air, at the breathing level, by a competent chemist is desirable. For some solvents, there are continuous air sampling and recording devices which will help to ensure constantly safe atmospheres.—SAFETY RESEARCH INSTITUTE, INC.

◆

Oilstoning Straight Edged Tools

A combination stone is excellent. Use the coarse side for dull tools or where a rather coarse edge is desired. For a finished edge use the fine side. Note: It is assumed that the tool has come from the grinder with a square edge and with correct concave bevel.

Chisels

First be sure the oilstone lies on a perfectly level bench. Rest bevel of the tool flatly on the oilstone in a diagonal position as shown in Figure 1, with hands low to make the oilstone bevel correspond with the grinding bevel. Then push tool briskly forward and backward, bearing down hard on the forward stroke but relieving pressure on the backward stroke. Use entire length of stone to prevent hollowing out the middle. Swing the right arm from shoulder bending it only at the elbow and holding the wrist rigid. This is called "stroking." With each later stoning, the hands are held a trifle higher. When the bevel finally becomes too blunt the tool must be ground to establish new bevel.

To remove wire edge, turn tool over flat on the face of the stone and gently rub the wire off. This is called "facing the edge" (See Figure 2).

Plane Irons

Follow same directions as for chisels, bearing in mind that some plane irons are rounded at the corners. In such cases a slight side to side rocking motion is permissible in order that all parts of the cutting edge contact the stone.

Gouges

The bevel on a gouge must follow the curve of the tool. It is necesary, therefore, to give the gouge a rocking motion as it is pushed back and forth over the stone. See Figure 3. Hold the tool as closely as possible to one unchanging angle. Use a round edge slip (slip stone) to remove any wire that develops on the inside of the bevel as in Figure 4.

Knife Sharpening

All knives, from pocket to butcher knife, have a very narrow, wedge-like cutting bevel which culminates in the cutting edge. Always tilt the back of the blade up so that only this bevel rests flat on the stone.

Place knife flat in a diagonal position as in Figure 5. Raise back slightly to contact only the cutting bevel (AB). Begin stroke at the heel of the blade (B) and draw blade diagonally across the face of the stone to position CD.

Next turn knife over to position EF in Figure 6. Raise back of blade and draw diagonally to position GH. Repeat above strokes over and over. With practice, they will blend into one continuous stroke. Should the knife be very dull, use coarse side of combination stone first, finishing on fine side.

For keenest edges on pocket or wood-carving knives, use a Washita or Arkansas. A Sloyd pattern knife is sharpened by laying its full bevel flat on the stone.

How to Care for Oilstones

Use plenty of oil. It reduces the hazard of overheating and prevents glazing caused by bits of steel which otherwise would be forced into the pores of the stone. Do not use heavy oils or greases. They gum up and slow cutting action. A thin oil is best. Kerosene or kerosene mixed with light machine oil may be used. When not in use, keep stones clean, oil-moistened and well covered. A gummy stone may be cleaned with gasoline.—BEHR-MANNING.

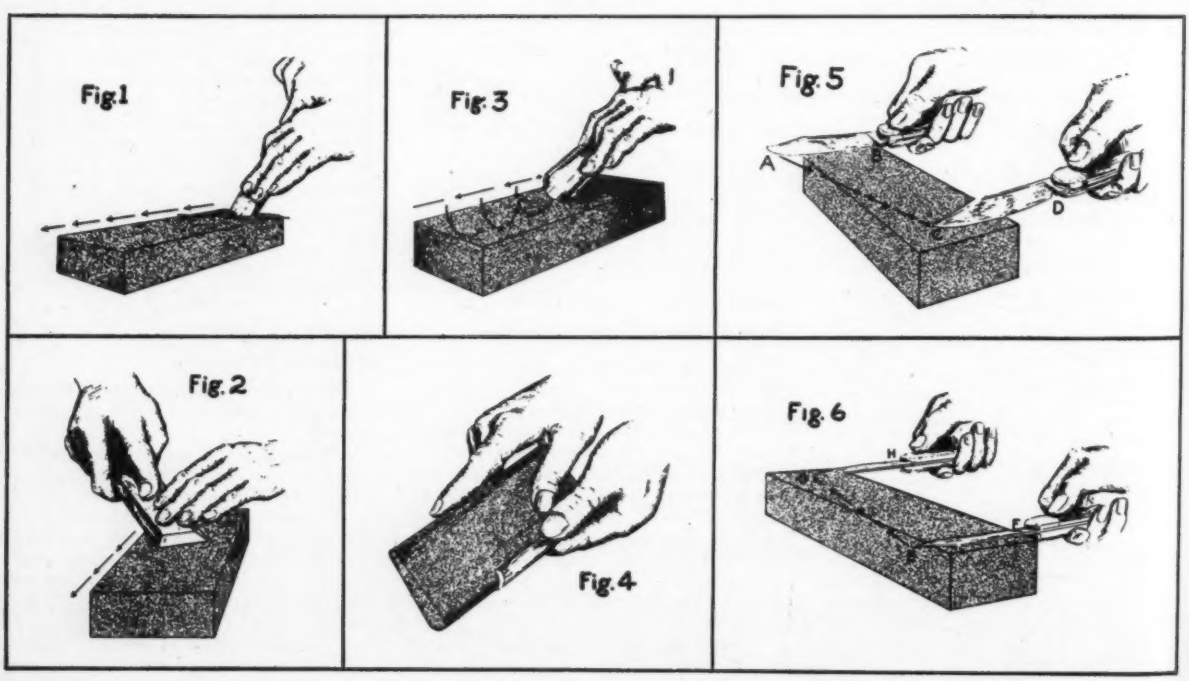
◆

Prevention of Fires When Using Gas Welding, Cutting and Brazing Equipment

1. When work is being done in other than regularly designated areas, supervisor shall obtain permit from proper authority before starting work.

2. If the work cannot be done in a noncombustible or sprinklered building, or if other flammable materials are located near by, special precautions must be taken to make certain that sparks or molten metal produced during welding or cutting operations do not reach the combustible material and thus start a fire. Sheet metal guards or asbestos blankets can be used for this purpose.

3. Fire prevention devices shall be provided and shall consist of small water hose with adjustable nozzle, sand or water



pails, carbon dioxide, carbon tetrachloride (Pyrene) chemical fire extinguishers and asbestos blankets. When using the carbon tetrachloride fire extinguishers the operator shall be careful not to breathe the fumes as they are very toxic.

4. It is dangerous to use a torch in dusty or gassy atmospheres or in places where paint spraying is being performed. Authorization to weld or cut under these conditions shall be obtained from the proper authority.—*Safety for Gas Welding, Cutting, and Brazing Operators,* GENERAL ELECTRIC CO.

◆

Various Kinds of Pipe Connections of Valves

The most commonly known are *screwed ends, flanged ends and welding ends.*

Welding ends are generally specified only for steel valves. They should be used where elevated pressures and temperatures are to be encountered and an absolutely tight, leak-proof connection must be maintained over a long period of time, as in the modern power plant. Weld end valves and the pipe, when welded together, actually become one integral section. Ends can be supplied for either butt welding or socket welding.

Screwed ends, as the phrase suggests, are tapped usually with female threads into which the pipe is screwed. Screwed end valves are the least expensive, as less material and less finishing are required. Also they can be more quickly and easily installed in the line. However, unless a number of extra fittings such as unions, etc., are used, it is difficult to remove them without dismantling a considerable portion of the piping.

Flanged ends make a stronger, tighter, and more leak-proof connection. Where heavy viscous media are to be controlled, as in refineries, process and chemical plants, etc., flanged end valves should be recommended. They are higher in first cost, not only because more metal goes into them, but the flanges must be carefully and accurately machined. Also the installation cost is greater, because companion flanges, to which the valve end flanges are bolted, as well as gaskets, bolts and nuts must be provided.

The big advantage of flanged end valves is the ease with which they can be taken out of the line for inspection or reconditioning. All that is necessary is to unbolt the flanges and slide the valve out. Flanges can be supplied with various facings—plain face, raised face, male and female joint, tongue and groove joint and ring joint—the type of facing determined by the service for which the valve is to be used.—THE WM. POWELL CO.

◆

What the Worker Expects of a Leader

Some companies seek to develop leadership by presenting it from the standpoint of the employees. One training manual shows an analysis of the things an employee wants to see in his leader, including the following:

1. The employee wants to follow a leader who is not afraid of his position, his own boss, a tough job, the people who work for him, or of honest mistakes—either theirs or his.

2. He wants a leader who is enthusiastic about his work and helps his followers to be enthusiastic about theirs.

3. One who will fight for him if the leader believes him to be in the right.

4. A leader who will tell him what's what when he knows it's coming to him, without losing his temper.

5. One who recognizes him as a person, regardless of his experience, school, training, station in life, or the organization to which be belongs.

6. A leader who is predictable—that is, one he can depend upon to be the same all the time.

7. One whom he knows understands him, to whom he is not afraid to go when he has been a fool, when he's ashamed, when he's about washed up, or when he's proud and happy.

8. A leader who can show him how to do a job without showing off or showing him up.

9. He wants a leader who he believes sincerely wants him to succeed and who will be proud of him when he does.

10. He wants a leader who respects his pride and never corrects him in the presence of others or gossips about him.—From *Training Supervisors in Human Relations,* a report prepared by Policyholders Service Bureau, METROPOLITAN LIFE INSURANCE COMPANY.

Paper-mill machinery shop using portable Oxweld cutting machine to bevel-cut additional knife pockets in chipper disc—The Linde Air Products Company

Calculating Liquid Flow in Partially-Filled, Horizontal Pipe

A reader of THE PAPER INDUSTRY AND PAPER WORLD has inquired regarding this writer's article on "How To Calculate Liquid Flow From Horizontal Pipe" which appeared in its issue of July, 1946. The inquirer wanted to know whether the formula given in the item could be used in calculating the flow from a horizontal pipe when the pipe is only partially filled.

The answer to the question is "Yes." Before using the formula, however, determine the cross-sectional area of the water actually flowing. Thus, for example, if the internal cross-sectional area of the pipe is four square inches, and if the cross-sectional area of the water in the pipe is three square inches, the flow would be three-fourths of that given by the formula.

In other words, for a partially-filled pipe, the rule is:

a) Find the cross-sectional area of the stream of water as it leaves the pipe.

b) Find the internal cross-sectional area of the pipe.

c) Divide A by B.

d) Multiply the quotient obtained from C by the flow as given by the formula in the item to which reference already has been made: namely, "How to Calculate Liquid Flow From Horizontal Pipe," appearing on page 561 of the July, 1946, issue of THE PAPER INDUSTRY AND PAPER WORLD. W. F.SCHAPHORST.

Convention Papers . . . Abridged

Report of Industrial Relations Committee of the Waxed Paper Institute*

P. J. MASSEY

Since the last report of your Committee, American industry has experienced the high tide of industrial strife. Some ill-advised labor leaders through dictatorial measures released counter forces much greater than their assumed powers and the crisis is now on the ebb.. The present period is even more critical than the one just experienced. The eddys and whirlpools generated by the present reaction demand cool sound judgment on the part of management, or industry will be carried into more serious situations than those recently experienced.

Those reactionary and primitive forces which are on the horizon today may tear down our entire economic structure and nullify the real constructive efforts of management to work out a partnership with labor on a sound mutual basis.

Management must assume leadership in labor legislation. The starting point, and in my opinion the only legislative assistance required by society to bring about industrial peace, is to enact into law a measure compelling unions and all other so-called non-profit organizations to incorporate — thereby being subservient to all municipal, state, and federal laws. The danger to society not only of unions but of many other forms of militant organized minorities is serious, and is tending to destroy our basic institutions including the Constitution itself. It is also a serious threat of possible dictatorship.

If management is placed in position to bargain with *responsible* units representing labor, and which are amenable to the same laws as management, industrial peace will be a natural result.

A summary of labor's immediate program is:

1. Increased wage for any increase in cost of living
2. Guaranteed minimum weekly and yearly wage
3. Participation in management
4. Division of all profits over normal return on investments
5. Security fund for protection of labor against hazards of industry

The paper mills of the Pacific Coast and the rag paper mills of Wisconsin have entered into union agreements. These agreements, which provide for joint negotiations once a year between the associated mills and the unions, do away with separate contract negotiations between the individual companies and the unions.

Employers and unions set up a joint wage committee which studies job classifications and rates in the various mills with the purpose of eliminating rate irregularities and errors in nomenclature of jobs. The findings of the committee are reported quarterly and any errors are corrected.

The master agreement also provides for identical daily and weekly hours of work, overtime compensation, starting and stopping time, compensation for call backs and reporting time, changing of wires, vacations with pay, shift differentials, working time and pay rates for Sunday and holidays, and for universal arbitration in all mills.

The Brotherhoods of paper and pulp makers proved that management and responsible labor representatives can co-operatively achieve industrial peace. Negotiations for the adoption of master agreements by paper mills in other sections of the country are now in progress. Some segments of industry must initiate the movement for sanity in industrial relations if industry is to benefit from the advances in applied science evolved during the war, and to apply them to industrial operations in orderly fashion. The principals involved in the accomplishment of sanity are management and labor. The Waxed Paper Institute is a representative segment of American industry. Therefore, the Institute carries its share of the burden and faces a real challenge to its management. If costs per ton in a member plant have increased in direct ratio to labor wage increases, the member has not accepted this challenge. Real management has changed the details and pattern of its operations, thereby increasing production and absorbing the raise in part or in whole.

At the last meeting of the Industrial Relations Committee, a definite eight-point program was established. Let's take inventory of the progress of the program to date.

1. *Thorough Knowledge of the Tasks Performed by Our Workers and the Relative Value of These Jobs*

Job analyses data are most imperative at this time. The unions are making job analyses in the paper mills today. Surely Institute members will be at a disadvantage if the unions with which they are negotiating know more than they do about the jobs. Reports of 18 companies indicate that they have made no job evaluation.

Those companies which have not made a job evaluation are making a mistake. The advantages far offset any objections, as proved in a great many instances.

Getting all job rates in true relation to one another will result in better personnel relationship between employees as well as between management and labor. Dissention, which leads to misunderstanding and, in many instances to strikes, is eliminated thereby.

2. *Co-operative Wage Payments of Each Unit to Other Competitive Units and to the Industry as a Whole*

On April 18, 1946, a summary was sent to the 31 companies participating in the Waxed Paper Wage Survey. This summary detailed the wage data on 32 jobs common to the companies participating.

The collection of similar wage rates, current at this time, from 32 companies has been completed.

The concept of some of our members is that the labor data should be kept secret. That the names of the individual companies furnishing these data should not be made available to all contributing members is rather difficult to understand. The only possible result of such a position is to seriously impede the benefits therefrom, and in a large measure nullify the whole program. Other segments of the paper industry not only make available

(*) Abridgment of report presented at the Summer Meeting of the Waxed Paper Institute, Inc., held in French Lick Springs, Indiana, June 27-28, 1946.

Graphic, pictorial testimonials, from progressive users, vouch for the exceptional job it is doing in handling pulpwood logs.

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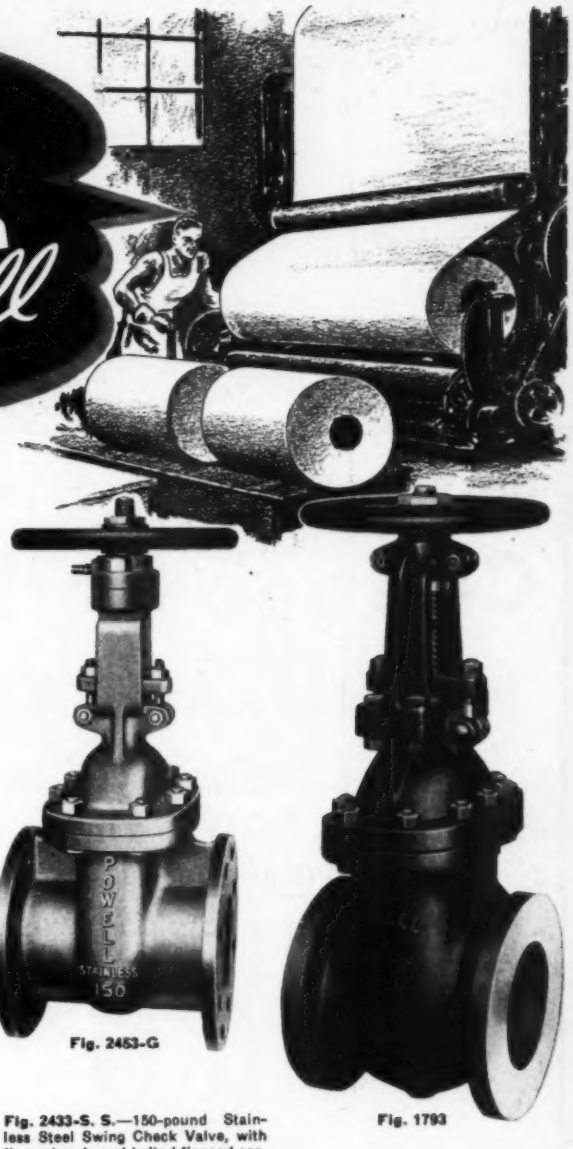

Years ago, when American Industry was still in its infancy, The Wm. Powell Company adopted a definite, farsighted policy . . . to concentrate on making valves only—valves of *every* design, for *every* service in *every* branch of industry.

That is why, today, Powell can supply valves to meet every known flow control requirement in your plant. And, if you have any flow control problems, Powell Engineers will gladly help you solve them.

When writing for catalogs, kindly specify whether you are chiefly interested in Bronze, Iron, Steel or Corrosion-Resistant Valves.

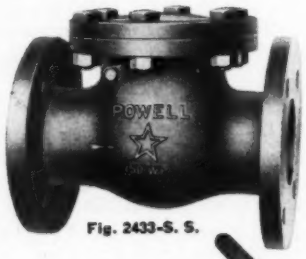

Fig. 2433-S. S.

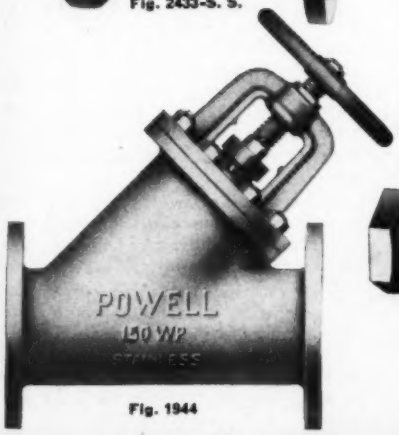

Fig. 1944

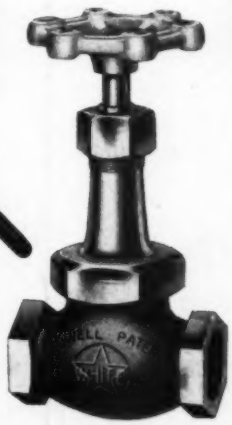

Fig. 1708

Fig. 2453-G

Fig. 1793

Fig. 2433-S. S.—150-pound Stainless Steel Swing Check Valve, with flanged ends and bolted flanged cap. Sizes, 2" to 12", inclusive.

Fig. 1944—Large size 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem. Sizes, 2½" to 12", inclusive.

Fig. 1708—200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable stainless steel seat and regrindable, renewable, wear-resisting "Powellium" nickel bronze disc.

Fig. 2453-G—New, Standard 150-pound Stainless Steel Gate Valve with flanged ends, bolted flanged yoke-bonnet, outside screw rising stem and taper wedge solid disc. Sizes, 2½" to 8", inclusive.

Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, bronze seat rings and taper wedge solid disc. Also available in All Iron.

The Wm. Powell Company, Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

this type of data to management, but co-operate fully with labor in the application of such statistics. The chairman trusts that a favorable decision will be reached at this meeting to give the code numbers to every company distributing labor data. This procedure is the only way that the Institute can secure the full value of its Industrial Relations Committee's efforts.

3. *Clearly Defined Ideals*

The Committee is extremely sorry that it cannot present factual data on this unit of the program.

Only one company has reported that efforts in conformity with the ideas presented herein have actually been put into effect. Labor's program covers this in its demand for voice in management, and labor's pressure on this demand will accelerate as time goes on.

4. *Collective Bargaining*

While a number of members have verbally reported that they have made application of the principles of collective bargaining in their various plants, the Committee has only one factual report on this unit of the program. As noted before, some of the paper mills have gone further than the individual application, and are working collectively and co-operatively with labor representatives.

5. *Fair Dealing and Security*

This unit, also, has not been reported on by the Institute membership. Neither pros nor cons have been expressed. Yet, it is of extreme importance in member firms relations with labor.

Manufacturers in the waxed paper industry should consider the following points:

a. Are your operations seasonal?

b. Do you hire your new employees on the basis of temporary and/or permanent employees?

c. What will it actually cost your company to guarantee a minimum weekly-yearly wage?

d. What will it increase your hour rate?

e. What will it cost you per ton?

Until you have made such a survey you cannot possibly decide upon the merits of this important development in humanics as applied to your own company.

Also under this head must come the consideration of increased wage for increased cost of living.

6. *Adequate Static Accomplishment Records*

The Committee has received no factual information on this unit.

It is very important, and will be reviewed later under No. 8.

7. *Working Conditions for Labor*

The Committee has received no factual information on this unit. Under this unit comes one of the ideals of the present labor program, vacations with pay.

The Committee wishes to report that out of the 32 participating members, 30 are now operating a full-pay vacation plan.

8. *Efficiency Rewards*

"Some form of efficiency reward is essential if true co-operative effort is to be assured." The reiteration of this sentence from our last report is apropos of the present trend in industrial relations.

Labor is more conscious than ever before that increased production is the only positive insurance for higher wages. This trend is well illustrated by the Paper Makers Brotherhoods machine rates which are based on per inch width times feet per minute. It does not seem that there is any more equitable method of compensation.

The adoption of management and labor of some static production unit would eliminate the principal cause of objection from labor to measured work of any kind.

With the establishment of such a base for negotiation it would not be difficult to sell labor on the acceptance of other efficiency rewards such as group and profit-sharing bonuses. The latter is one of the prime objectives in the labor program.

In the evaluation of this rate of pay idea, consideration must be given to labor's demand for partnership in the earnings of industry. Through the establishment of this base line, thereby permitting management to directly evaluate labor's effort, it will have a yardstick for further extending labor's participation in management.

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FULL SPEED CHANGE OF ROLLS

on super calenders, coaters, and all converting operations

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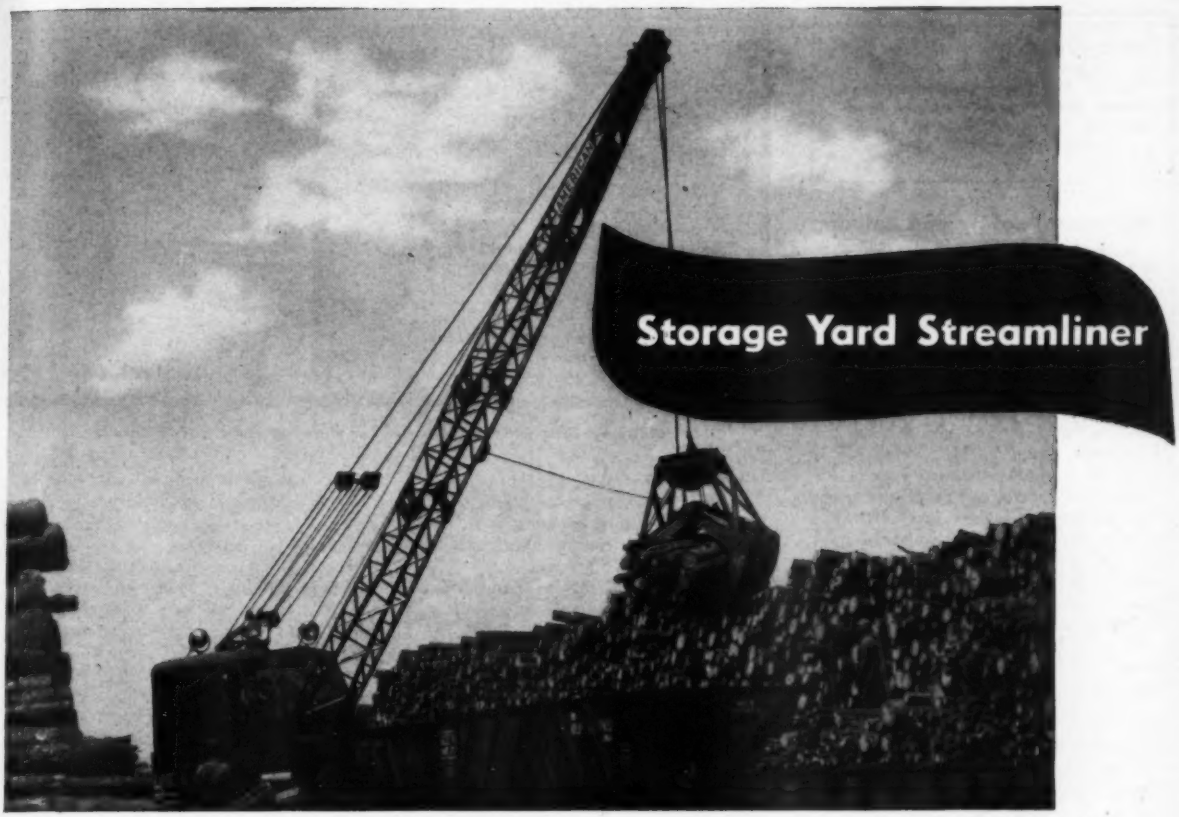

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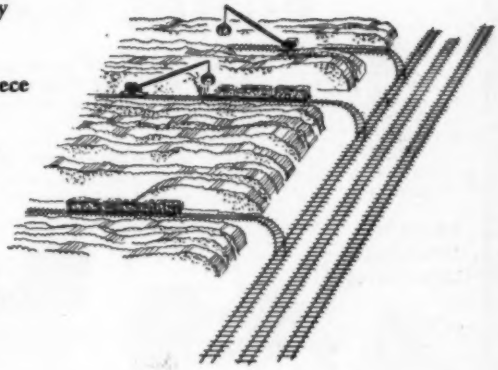
The rail-served storage yard comes into its own as this one piece of equipment streamlines all storing and stock-piling, unloads ships, builds track. Fast, smooth, steady, low-cost handling . . . easy operation, winter and summer . . . extremely low maintenance . . . all are assured. It's smoke and spark-free.

Improve, expand *your* storage and stock-piling facilities this modern way. We have the performance facts — they're yours for the asking! Ask for Catalog 600.



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REVOLVERS LOCOMOTIVE CRANES HOISTS DERRICKS BLOCKS AND SHEAVES CROSBY CLIPS

Abridgments in this section are from papers presented at the annual meeting of **The American Pulp and Paper Mill Superintendents Association,** held in Poland Spring, Maine, June 17-20, 1946.

Continuous Beating and Refining

DOUGLAS M. SUTHERLAND
Sutherland Refiner Corporation

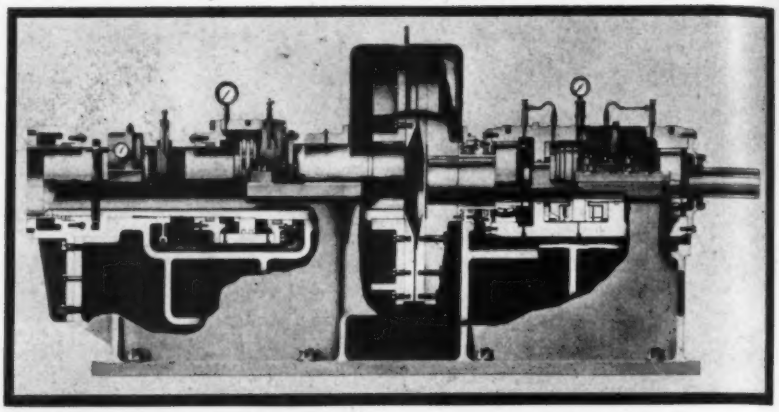
The desire to obtain continuous stock preparation is brought about by two principal factors. These factors are:

1. Batch operations do not give the desired control of pulp necessary for high speed paper machine operation.
2. The operating and maintenance cost of a batch system is high compared to a modern continuous refining system.

The finest control can only be obtained when the refining is done in a single pass operation in such a way that variation in pulp to the refiners can be adjusted for immediately and this adjustment reflects itself on the paper machine without loss of time or paper.

In a modern mill, continuous system savings will be reflected in:

1. Lower power per ton of paper
2. Less floor space
3. Lower labor cost
4. More uniform paper machine operation
5. More flexibility of operation
6. Better control of paper quality
7. Ease of control over refining
8. Simplification of system with consequent savings in time, material and labor during washups



Cutaway view of Sutherland refiner showing construction details

The Sutherland refiner was specifically designed for continuous operation in a single pass.

The refiner basically is composed of a rotating element, stationary element and a frame for holding the elements in alignment. The rotating element is equipped with radial and thrust bearings and a flexible coupling for direct connection to the drive motor.

Lubrication of the bearings is by oil drawn from a storage tank in the frame. It is passed through a cooler and filter under pressure into the bearings. To insure against operation of the refiner without an adequate supply of oil, a switch is incorporated into the system which will shut down the main drive motor if the oil system should fail to maintain five pounds of pressure in the bearings. It will also prevent startup of the refiner without first building up the required oil pressure in the bearings. All parts of the refiner in contact with the pulp are manufactured of stainless steel.

The stationary element consists of a pulp inlet tube, heads and disc equipped with a hydraulic piston to adjust the setting between discs and a mechanical locking mechanism to lock the refiner in a predetermined operating position.

The frame supports the rotating and stationary elements rigidly so that when the discs are brought together, they are accurate to within .001" across their face and maintain this accuracy at all times.

A patented check ring controls the discharge of the disc at its periphery. The importance of this check ring cannot be overstressed as it is the first effective means developed to control the beating time of disc type machines. It serves the same function as retarding the flow of stock in a jordan by closing the discharge valve or by controlling the beating time of a beater.

By regulating the rate of discharge of refined pulp at the check ring, capacity is regulated and, therefore, beating time. The disc refiner like any other unit must hold the stock between the refining elements sufficiently long to accomplish the desired amount of refining.

Although beating time in the Sutherland refiner is measured in fractions of a second, it must be kept in mind that all of this time is spent in effective beating. Another way of visualizing the beating time of this refiner is to look upon it as a unit which takes a small quantity of stock, seven to fifteen pounds, depending on disc design, consistency, etc.; works it thoroughly; discharges it; then repeats this process over and over again.

As the method of doing work on pulp is basically the same as other types of refining equipment, it might well be asked what makes the Sutherland refiner par-

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PUMPS *"by Aurora"*

Aurora Deep Well Turbines for all conditions—4" to 24"

The able performance of our pumps, with high efficiency and lasting dependability, fulfills the fundamental purpose of our business. The full range of types and sizes in which AURORA CENTRIFUGAL and APCO TURBINE-TYPE PUMPS are available meets practically every industrial pumping need. Put a PUMP "by Aurora" on that next liquids handling job. You, TOO, will LIKE it.

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SIZES FOR EVERY DUTY, LARGE OR SMALL

Type OD Hor. Split-Case Double Suction Single Stage Centrifugal

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APCO Single Stage Turbine-Type

Type GMC Close-Coupled Centrifugal

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ticularly adaptable to single pass operation and what permits it to control pulps so accurately for the paper machine.

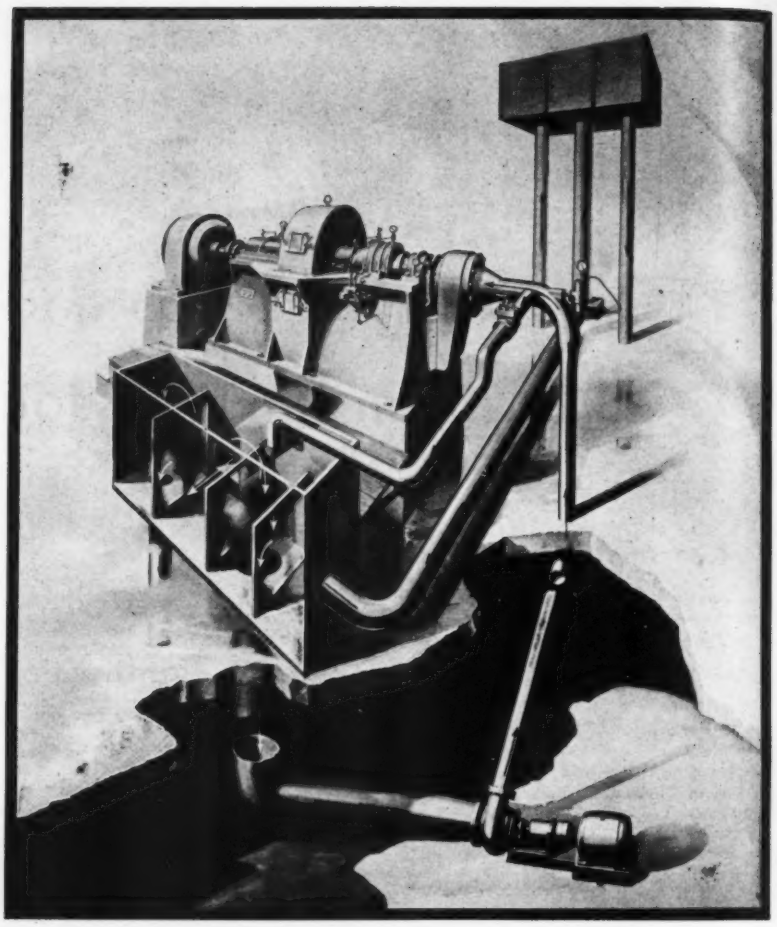
Single pass operation is always possible when the proper combination of bar passes or impacts is available per pound of stock in a refiner.

The centrifugal forces generated by a large disc rotating at relatively slow speeds —an example is a Sutherland 42" refiner rotating at 450 rpm—are extremely high and very little power is expended in moving the stock across the face of the disc.

This high centrifugal force permits design of disc with a high ratio of bar to groove area which results in an extremely high number of bar passes per pound of stock. This plus the action of the check ring retaining the stock in the disc for the desired beating time permits the Sutherland refiner to accomplish any desired reduction in particle size in a single pass.

For the finest control of stock quality coming from the paper machine, it is necessary that the refining equipment be installed as close as possible to the paper machine and that it be of such a design that minor changes can be quickly made to the refiners and reflect immediately on the paper machine with the proper quality.

To accomplish this ideal type of control, the Sutherland refiner has two methods of controlling stock quality. The first method is to adjust the setting between the discs. When this setting is made, the refiner is locked in place so the relationship between rotating and stationary elements is fixed mechanically. For additional minor adjustments, the stock inlet pressure is regulated by opening or closing a pressure regulating valve on the stock inlet line. Changes in pressure effect the beating time of the pulp, thereby changing characteristics of the stock going to the paper machine.



Phantom view of refiner installation located between regulator box and fan pump

The controls on the refiner give the operator the ability to exactly regulate the stock to fit the paper machine requirements. The next step is to install the refiner close to the paper machine so changes of stock quality will show on the paper machine without loss of time or paper.

Two typical installations of Sutherland refiners will show the following results:

Example No. 1 is an installation of one refiner doing all the preparation for a paper machine making book, bond and writing grades. Since the refiner was installed, there has been approximately 40 per cent reduction of power. The mill reports the following changes in the quality of paper made on this paper machine —greater retention of filler, high density with a marked increase in fold. Other characteristics remain essentially the same as with their previous conventional stock preparations system. In this case beaters and jordans were replaced.

Example No. 2 is an installation operating on a wide variety of grades including book, bond, bristol, high density label, music and offset papers with the refiners replacing beaters and jordans. One jordan is installed as a tickler. The savings in power are approximately 35 per cent to 40 per cent The mill reports improvement in formation, fold and retention without loss of the other desirable qualities.

As Sutherlands operate on wide varieties of furnish ranging from 100 per cent kraft to 90 per cent hardwoods with and without fillers, no attempt has been made to give specific performance figures on any particular grades. However, the operation of Sutherland refiners in a continuous refining system may conservatively be expected to accomplish the following results:

1. Reduce power an average of 50 per cent
2. Reduce floor space
3. Reduce labor cost
4. Increase filler retention
5. Improve formation
6. Increase fold
7. Give the finest possible control of stock to the paper machine

SIXTY SECONDS

worth of distance run every minute

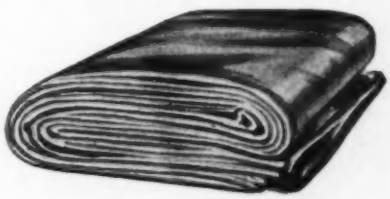
Kipling must have been thinking of paper manufacturers when he referred to the necessity of "filling every minute with sixty seconds worth of distance run."

Every minute of slow-down to complete the drying operation after the sheet leaves the couch means less than sixty seconds worth of distance run by the sheet. Every minute of down time for adjustment of the felt means sixty seconds worth of distance lost.

These are two powerful reasons for equipping your paper machines with Hamilton Felts.

Properly installed, every Hamilton Felt runs *true* at all speeds of the machine — seldom requires adjustment — removes water so completely that no slackening of speed is necessary for thorough drying—fills every unforgiving minute with sixty seconds worth of distance run. And distance run means tonnage produced.

• From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.



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• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •

The Converter Needs More Than Paper

LLOYD M. PERRY, Chief Chemist
Nashua Gummed & Coated Paper Co.

You papermakers are exceedingly skillful. You can take an unmanageable little fiber, a millimeter or two long, and string it with a lot of similar fibers into a width of twenty-five feet and into as many miles of length as you choose to wind in a roll. You can intricately felt these fibers together at the rate of a mile in five minutes.

You have made pulp preparation a well-controlled science and you've made good cellulosic fibers from an extraordinary variety of materials. The inkmakers have taken advantage of the increasing number of new synthetic products to compound inks that are nicely controlled and in wide variety. But there hasn't been any fundamental change that I know of in the art of putting fibers together in the form of paper. And I know of only one fundamental change that's been proposed in the art of laying ink in predetermined patterns—and this seems still highly experimental.

Glassine and wet strength paper are instances where the papermaker has significantly and usefully altered his product. And the converter, in vegetable parchment and vulcanized fiber, has made paper into something different and useful. But can you think of any other significant alteration of paper that doesn't comprise quite simply the addition of other materials to paper?

This putting of other things with paper after it's made characterizes the converter's business. It's almost as ancient as papermaking and neither you nor we have significantly altered our arts.

The first gummed label was a postage stamp, the British penny black stamp of 1840. The gumming was widely blamed for all sorts of ailments, including cancer of the lips and the spreading of a plague epidemic. The gumming, actually, was potato dextrin, still used for first class gummed labels. The adhesive was prone to spot, the paper was uneven and the customers complained at great length.

A century ago the forebears of the McLaurin-Jones Company of Brookfield, Massachusetts, were making gummed paper in Great Britain. This carries us back almost to the year of the penny black stamp. Around 1886 Samuel Jones and Company, Ltd., made in England the first gummed paper in roll form. Four or five years later Charles H. Crowell, in Lynn, Massachusetts, and the Dennison Manufacturing Company were making gummed paper and gummed cloth in rolls.

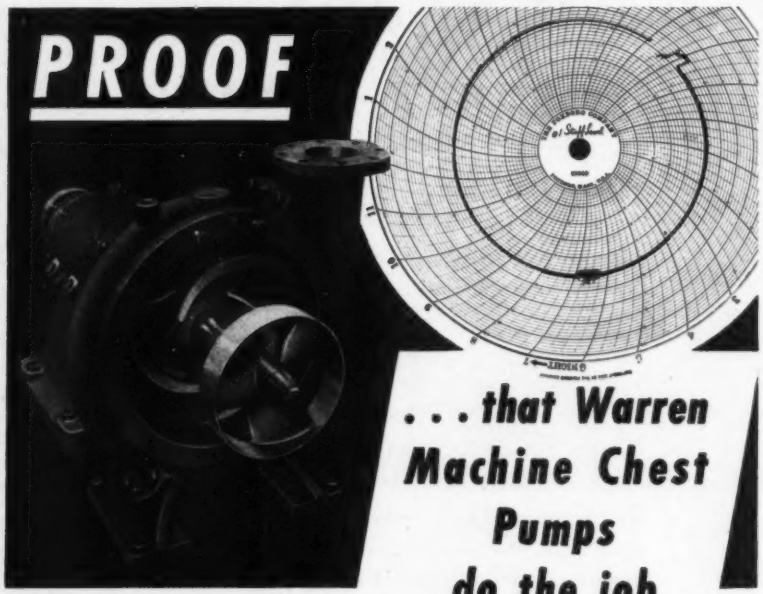
Earlier than this, in 1852, William Waldron had made the first coating machine in America. Shortly thereafter Gage-Murray and Company, in Nashua, New Hampshire, installed machinery for coloring paper in rolls. Twenty-three years later, in 1875, Charles Gage, in Springfield, Massachusetts, was the first to make double coated book paper.

In the late 1880's a young man named Henri Sevigne was selling a little waxed paper to bakers and preaching the need for sanitary wrapping. He later designed a bread-wrapping machine and arranged for the commercial manufacture of paraffin waxed paper at Nashua by the Nashua Gummed & Coated Paper Co. Manufacture was started in 1907.

The origins of the company I work for trace back, in gumming and laminating, to Charles H. Crowell, of Lynn, and, in coating and machine glazing, to Gage-Murray and Company, of Nashua. Our company was one of the first to manufacture waxed paper for breadwrapping. These operations, plus printing, constituted our company's business twenty-five years ago. Add wallpaper, carbon paper, photographic paper, rigid containers and bags and I think you have the bulk of the converting business in 1921—nothing modern here.

Now the converter griped about his paper twenty-five years ago just as he does now. But, for the quality of product he was making, for the quality of materials he was adding, the paper he was getting was generally adequate. Let's look at the materials he had.

For gumming and laminating the converter had animal and fish glues; he had dextrines, starches and glucose; in lesser amounts he had vegetable gums such as arabic and tragacanth. He had glycerine for a humectant.



THE chart above, made at the plant of a large paper manufacturer, is positive proof of the constant, uniform delivery of Warren Machine and Jordan Chest Centrifugal Pumps. It shows a 24-hour record of stock level in the regulating box... head in chest varied from 0 to 8 feet, yet practically throughout the entire test, the Warren Machine Chest Pump maintained the regulating box level *constant to a fraction of an inch!*

A Warren Centrifugal Chest Pump gives you these advantages over a plunger-type pump: smooth flow without pulsation; discharge valve can be closed and not build up excessive pressure on pump and discharge line; takes up less floor space and much less head room; no pockets to hold old stock; a diagonally split case makes it unnecessary to remove discharge piping—rotating member can be easily lifted out; no noisy gears to create vibration.

The maintenance charges of a Warren Centrifugal Chest Pump are low as compared with a plunger pump. Renewable liners prevent wear on suction heads—there are no plungers to be turned or replaced. *And in addition, the initial cost of a Warren Centrifugal Chest Pump is lower than that of a plunger pump of much smaller capacity.*

A Warren Centrifugal Machine or Jordan Chest type pump... in operation in *your* plant... will assure uniform delivery under varying conditions of suction, submergence and density of stock. Write for complete information and list of installations.

Warren Pumps

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Warren Steam Pump Company, Inc., Warren, Massachusetts

A Better Form of Control for the Entire Alkaline Pulp-Cooking Process

AUTOMATIC DIGESTER LIQUOR MEASURING SYSTEM

In a compact, convenient, easily-installed unit, Foxboro offers you a most efficient control system for metering correct amounts of white and black liquor to the digester. By merely pushing a button, an operator can get the exact charge required, and without further attention, the liquor measuring system will be ready for the next cook. Accurate control of the total alkali content of each cook is simple this way. Improvement in the uniformity and quality of pulp naturally follows.

This cabinet control system combines the time-tested, air-bubble method of liquid level measurement with Foxboro's trouble-free Rotax electrical control. It consists of two Rotax Liquid Level Controllers for white and black liquor, together with push-button stations and signal lights. Manual valve and pump control is provided for cases of emergency.

Instruments and push-button equipment come all assembled, wired and piped . . . ready for easy connections with power, air, valves and pumps. Instrumentation in this pre-engineered cabinet form has eliminated installation headaches.

AUTOMATIC DIGESTER COOKING CONTROL SYSTEM

The packaged digester control unit pictured here automatically maintains such close control of cooking time, temperature, and relief that wasteful variations are held to new minimums. Steam, chemical and labor requirements are substantially improved.

This compact Foxboro Automatic Digester Control System consists of a Dynalog 3-point Temperature Recorder, a Digester Relief Controller and a Cooking Schedule Controller with adjustable cam-set control point.

This is the form of completely automatic control that is helping pulp manufacturers operate on record-breaking production schedules at lower cost and at improved quality standards. Similar pre-engineered control is available for sulphite processes. Write for complete details. **The Foxboro Company, 158 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities.

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Automatic DIGESTER CONTROL

For pigment coating he had the inorganic pigments, excepting titanium pigments. He had color lakes derived by precipitating acid or basic dyes on an inorganic base. He had aluminum and gold bronze powders and mica. A finely dispersed tin paste had just been developed which, when coated, could be burnished on a friction calender to yield a lustrous metallic finish. For binding his pigments he had the adhesives employed for gumming—plus casein, which had come into rather general use but was highly variable in quality.

For waterproof coating the converter had formaldehyde treated glue and casein and he had shellac, employed generally in an alkaline aqueous solution. These coatings might be called water resistant but hardly waterproof. He had spirit and oil varnishes derived from natural or simple ester gums and natural drying oils. Half second nitrocellulose didn't then exist and lacquers were seldom employed.

For printing inks the converter had inorganic pigments and some organic toners. Linseed oil was the common vehicle for letter press and lithographic inks. Intaglio printing was from a spirit varnish type of vehicle or, in the cheaper grades, from an aqueous alkaline solution of naturally occuring resins, possibly admixed with casein. Gravure inks of lacquer types didn't exist and aniline printing was practically unknown.

For waxed paper there was low, medium and high test wax, the low being a little smelly and the high about 145 degrees in melting point.

For wallpaper there were the materials I've mentioned in coated paper. For containers there were the adhesives employed in gumming and laminating.

Rubber latex, so widely employed now in converting, wasn't available until about 1923.

This was in 1921 and the converter had pretty thoroughly exploited his ingenuity within the narrow limitations of the materials he then had.

He wasn't thinking then of new or better foundation paper. He was beginning to feel a bit frustrated, though, by the lack of materials that might be added to paper—especially materials of good uniform behavior.

With all the new sorts of materials the converter now has, with all the new things he's obviously planning to make, isn't he pretty soon going to be thinking of his paper and isn't he pretty soon going to be wanting something more than the product of a mechanized ancient art?

The first thing he is going to want will be very hard to get but I can express it in one word. That thing is precision. The second thing he's going to want is variety.

I have an urge to bring up a word that I'm sure few papermakers would dare mention to a converter. That word is "formation." I bring it up because I can think of no other word that so well suggests to a converter the opposite of "precision." Who ever heard "formation" described in the trade in any better terms than "good" or "poor"—or, in more heated moments, "beautiful" or "damned wild"?

One thing is sure: there will not be precisely formed paper until we're using a precise language for describing paper formation. And why don't we make a start at this?

Suppose we use the simplest sort of measurement. In brief, why don't we cut the paper up into little pieces and weigh the pieces. An eight millimeter square can be weighed on a semi-micro balance to a delicacy equivalent to one tenth of a pound per ream, 24x36-500 basis. A two and one-half millimeter square can be weighed to this delicacy on a good micro balance. I think that formation expressed as the weight variation of these small segments of a sheet will be quite precisely expressed. I think we may take for precedent that rather innocuous paper trade custom which decrees that a variation of not over plus or minus five per cent from the specification constitutes acceptable furnish.

It might be worked out something like this: Let's take from each unit sampled for basis weight one specimen one meter square which approximates in basis weight the average of that unit. Let's cut this into twenty-five pieces each two hundred millimeters square and determine the extreme plus or minus weight deviation from the average weight of the pieces. Let's express this as "per cent deviation, 200 millimeter square."

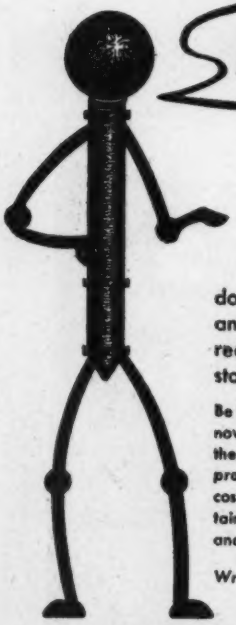
Now let's repeat, this time with the 200 millimeter specimen which most closely represents the average, cutting into twenty-five pieces each forty millimeters square. We'll express this as "per cent deviation, 40 millimeter square."

Let's repeat again, this time cutting a forty millimeter specimen into twenty-five pieces each eight millimeters square. We'll express this as "per cent deviation, 8 millimeter square."

I've proposed here seventy-five weighings in addition to those customarily made for basis weight determining—and twenty-five of them are going to be difficult, painstaking weighings. I think a torsion balance might be devised to greatly simplify these weighings, however. We read of a balance, for work of this delicacy, on which two weighings per minute can be made.

There's a difficult problem involved in accurately cutting such small specimens. With a specimen eight millimeters square, if we had a die accurate all around within plus or minus one hundredth of a millimeter, we would be accurate within one half of one per cent. Such a die might be made and practically employed. Perhaps it would be easier to make it round rather than square. We couldn't cut up the whole area then but we could still learn a lot about formation.

Will this advance, will it make more precise our knowledge of formation? If it will, I think it's going to be worth the time and effort. If it's done only once for each paper mill shift and done only once for each shipment or car lot the converter receives, I think we shall be



NOW IS THE TIME

• One of these days, perhaps sooner than you think, this seller's market will be over. Competition will be back—competition on quality and price.

That is where Vortraps will help. How? By insuring a clean sheet—a definite sales help. By cutting down operating costs in their savings of machine wires and screens, reducing wash-up time and materially reducing rejects. No dirt, no abrasive grit gets into stock when Vortraps are on the job.

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that's right, Mister...

The oldest glue, Animal Glue, *has proved it's good!* It's a time-tested, "natural" product—not a synthetic. And years of experience in the glue business go into the perfection of Armour's Animal Glue.

and that's not all...

Remember this about Armour's Animal Glue...

Easy to prepare
Easy to use
Completely uniform
Pure, clean, clear
High jelly strength
Chemically inactive
Tough and pliable
Does not deteriorate

• • •

Important: At present, demand for many grades of Armour's Glue exceeds supply. However, we'll gladly discuss your problems to help you make *more efficient use* of the glue that is available.

Armour's Animal Glue is easy to use... You can use Armour's Animal Glue *without complicated chemical additions!* Merely mix with water, melt and use.

It has no impurities . . . Armour's Animal Glue is commercially clean, clear, and one hundred per cent glue. This purity, plus high jelly strength, viscosity and tensile strength, means better sizing.

It's particularly good for beater and surface sizing . . . Armour's Animal Glue is chemically inactive on paper—there's no oxidizing, discoloring, flaking or shedding. It's grease-free...tough, pliable, light in color and clear...especially adaptable to top quality products.

It's absolutely uniform . . . The careful, scientific controls used in making Armour's Animal Glue mean *complete* uniformity . . . help assure efficient, uninterrupted production in your plant.

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making a good start. I'll be glad to cooperate with any of our suppliers in some exploratory testing of this sort.

There's not much point in talking precision in respects other than formation. Most of the other respects seem to depend so vitally on formation. The converter likes an even thickness, a smooth, level top surface. You can't kid him by taking an uneven sheet and smoothing it on a calender. It has soft spots where his coating sinks in and hard spots where it stays on the surface and he ends up with a mottled, spotty looking sheet. If he uses an aqueous composition the hard spots swell right up again, almost as though you hadn't calendered it. And the cockles and distortion caused by uneven formation are only exaggerated when the sheet has been calendered.

Uniform strength characteristics probably depend not only on formation but on other factors as well. However, isn't formation the greatest factor?

Paper of the same grade varies widely in absorptiveness, often with a pronounced difference in this respect between the two sides of a sheet. We learned this in the Gummed Industries Association, developing the Harnden-McLaurin Gummed Tape Tester. We wanted a standard kraft paper to which to apply gummed kraft tape. Now gummed tape in ordinary usage has a considerable excess of water applied when it's remoistened. If the tape were applied to window glass, it would slip and slide around for a long time. For quick set-up this excess of water must be absorbed quickly into the stock to which the tape is applied. In our standard procedure the taped joint is tested five seconds after application of the water. Using for adherend material different lots of the same type of kraft paper, we have encountered variations of fifty per cent or more in adhesive results; this was due to variation in the absorptive characteristics of the paper.

I don't think formation was the important factor here. Under our test procedure, I should expect variations of formation to be averaged so that a fairly constant result would be had. I'm a layman in papermaking and you'll have to tell me what makes paper vary in absorptiveness. But remember, in almost everything the converter does he's working with flowable materials and the absorptive characteristics of his paper are very, very important.

I'll mention color, whiteness and the general appearance of a given sheet. Uniformity in these respects may or may not be important. It depends on how the converter is going to use the paper. Some of you have picked up the converter's burden. If you apply a pigment surfacing just remember that the converter is held much more strictly accountable for his surface variations than is the papermaker.

I might also mention chemical and physical uniformity. I don't need to go into age resistance. You paper makers have covered that. But shouldn't the converter know such things as the Fado-meter life of a sheet and its *p*H. You see, for the past twenty-five years the converter has been getting acquainted with an ever-increasing number of new materials he can use with paper. The people who introduce these materials recommend them in such specific terms as melting point, specific gravity, solubility and compatibility, color, viscosity, reactivity and so forth. The converter really looks for this sort of stuff now.

The converter needs from the papermaker more than just paper. He needs precision and, second, he needs variety. Furthermore, he needs precision with his variety.

A large part of the converter's processing is still going to be with aqueous compositions. Many of you have learned quite expertly how to impart wet strength to paper. Paper tea-bags, I think, are remarkable in their combination of wet strength and rapid water permeability. Think, now, what you can do for the converter who has to apply wet coatings to your medium or lightweight papers. Can't you take your ordinary sulphite and groundwood papers and give them wet strength without significantly altering their other properties?

There's a lot of paper impregnating done with aqueous compositions and I think more will be done. Can't you make for the impregnator a well formed, freely absorbent paper that will hold together when it's wet?

Why can't you tissue makers expand the uses of lightweight papers by adding a property of wet strength? Why can't all of you go a little further? Why not provide papers that will be definitely graded in respect to wet and dry strength?

Now the kind of surface you furnish with your paper is very important. After you've removed or slicked down the fuzz, why don't you level off the surface? Under a little magnification some sheets look like a relief map of our White Mountain area and I'm afraid the real remedy lies in better formation. However, for some stop-gap improvement, I'm going to suggest that you consider an innovation you are doing very well with. I mean this coating you apply on a paper machine. Let's consider it, potentially, as a primer coating for a variety of subsequent converter operations. Your paper machine seems the ideal place for laying such a foundation coat. You have the paper there in its original state, uncalendered.

Don't think necessarily of the pigments or binders you've commonly employed. You want the composition that's going to fill and smooth most effectively your top surface. Look over all the materials, new or old, that you might profitably employ. And don't throw one out just because it looks costly. A little of the right material may mean a saving in the converter's processing that will more than offset its cost to you.

There are two general sorts of surface treatment that might be useful. One is a treatment which prevents the converter's material from penetrating the paper—a sort of pre-proofing treatment. This will be particularly serviceable where the converter employs organic solvent or hot melt coatings. The other is a treatment which smooths the surface without greatly altering the porosity of the paper. Some absorbency is desirable in certain converter operations, especially with aqueous compositions.

The converter wants paper of known density but I don't see much point in talking paper density until we have two reasonably level surfaces on the sheet. How can we talk density without knowing the volume and how can we estimate the volume of a sheet if it has an indefinite surface? But real and apparent density and voids, which constitute the difference

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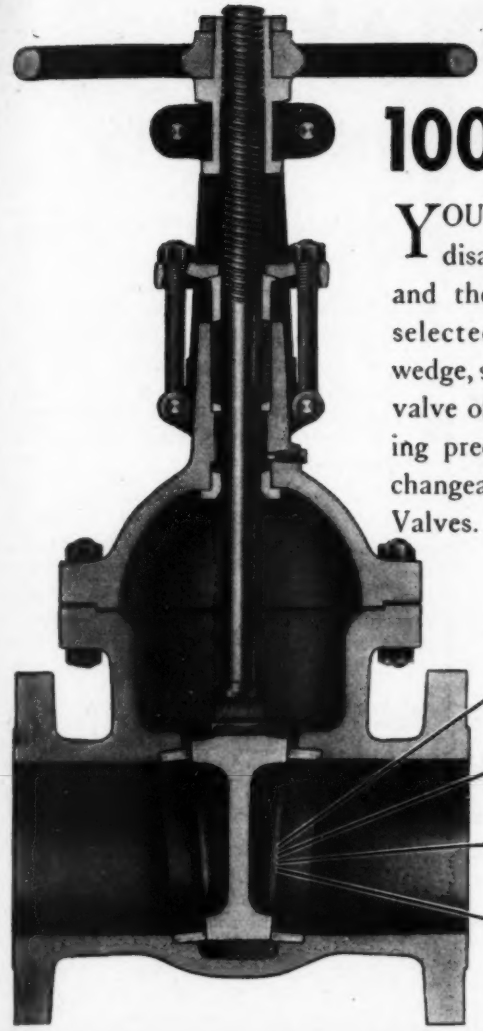

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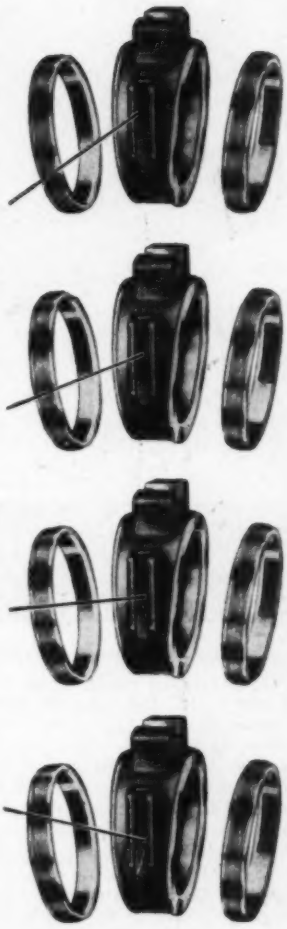

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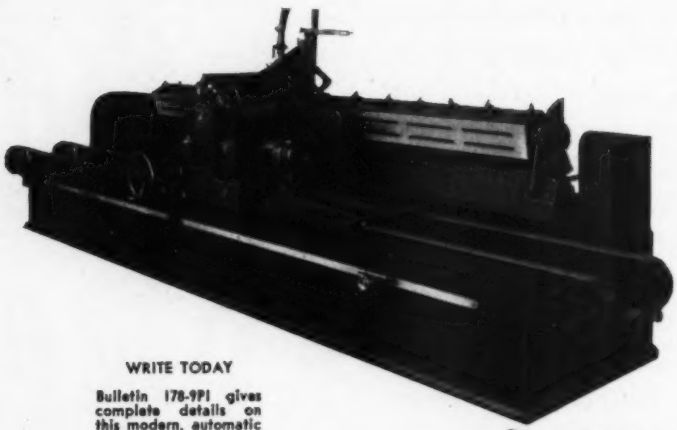

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between real and apparent density, are important. Let's get paper made with level surfaces and then let's begin to express paper in terms of voids or absorbing capacity. The impregnator can't advance his art until this is done. It doesn't matter whether he uses wax, rubber latex or any other impregnant; the poor chap is stymied both economy-wise and quality-wise if he can't know with reasonable accuracy how much impregnant he's going to put in his next ream of paper. Paper of specified absorbing capacity will certainly be a boon to the converter.

Can you make a relatively thin, dense sheet that's practically without voids? I don't mean glassine; I mean a fairly strong fibrous sheet that is flexible. I wonder if you might use a strong-fibered pulp with a highly hydrated, glassine sort of pulp as binder. It needn't have the transparency of glassine. The converter might make from this an inexpensive grease and vapor resistant wrapper. It might have a variety of uses where a thin strong sheet is desired. I think it might catch considerable converter interest.

Incidentally, have you ever tried laying a thin film of glassine pulp down over an ordinary sheet of paper, after the fashion of patent coated board? If this is practicable, you will be able to offer the converter another variety of paper that he can economically process and probably devise new products from.

Let's take a cold, critical converter's view of cellulosic paper for a minute. It shrinks and curls and distorts, even with changing humidity. It's brittle or pliable according to its environment and its very strength depends on the weather. The converter has accepted these handicaps with reasonable complacency. But believe me, he's often had a bitter, frustrated feeling, much as he used to have twenty-five years ago when there were so few good things he could add to paper.

Just imagine now that you've learned how to make a sheet of glass fibers and that you've found a waterproof binder that can be employed to size this sheet. Let's carry it further and imagine that this binder is as heat resistant as the glass it's binding.

Now you have something for a converter to be excited about—something he can dress up and sell for those requirements where price is secondary, where dimensional stability, heat resistance and long life are important; possibly where textiles have been used and ordinary paper wouldn't stand up.

You've got other fibers to work with, from organic plastics, that can be made as flexible as you may wish. Fibers that possibly an emulsion of adjusted solvents might bind as cellulose fibers are bound in vegetable parchment. Isn't this getting close to a fibrous, leathery material?

You'll say that a lot of the things I've asked for can't be had. All right, we'll be practical and accept what we can get. But let's leave all these things in the record to shoot at—these things I've said the converter needs beyond an ordinary sheet of paper.

First—A precisely formed paper and a precise means of describing formation

Second—Fuzzless papers, varied, and quite precisely varied, to suit the converter's needs in the following respects:

(a) Wet Strength
(b) Surface Treatment
(c) Capacity for Impregnant
(d) Denseness

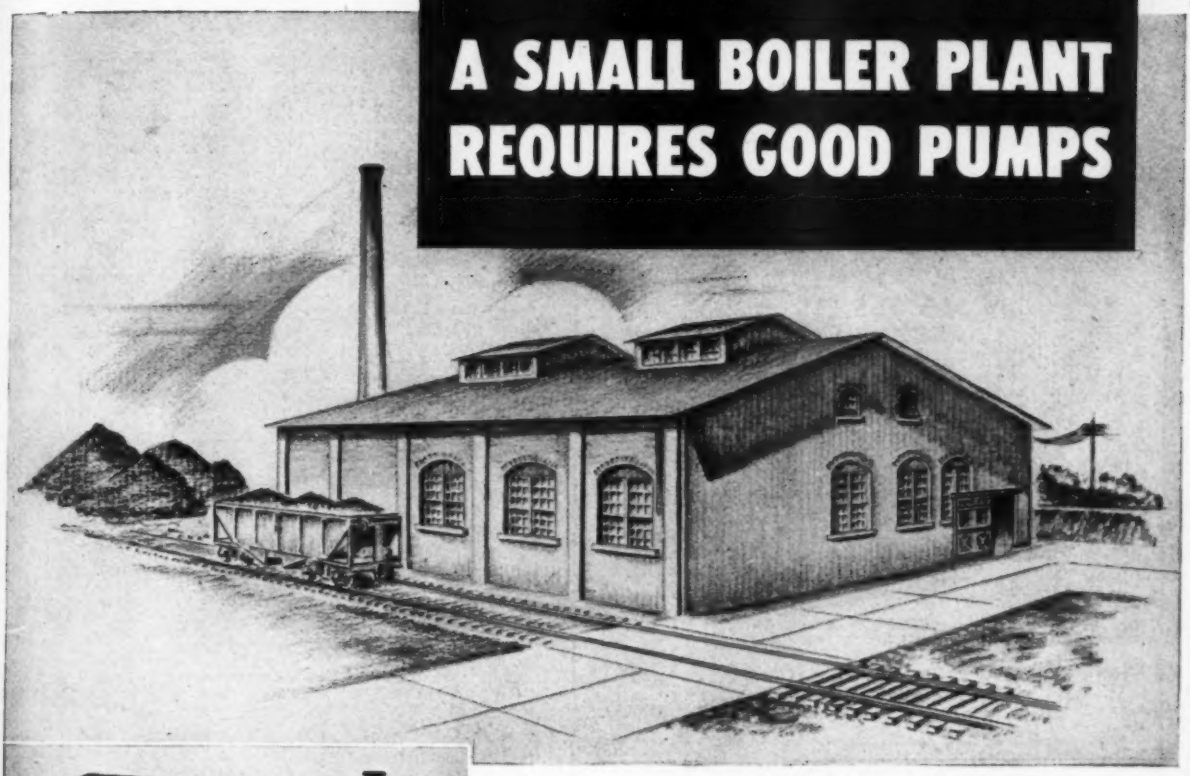
Third—(And please don't dismiss it too lightly) A dream sheet that's not cellulose

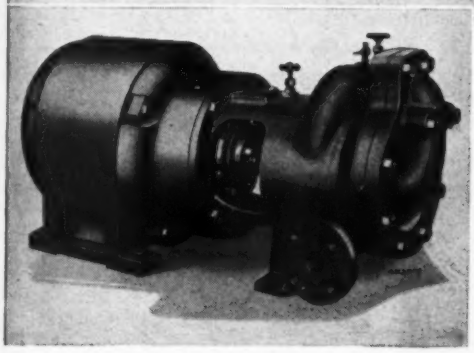
Here's a final thought for you. Twenty-five years ago the converter was exploiting paper. He was a paper converter. Now he still uses paper (and also some other foundation materials) but, do you know, it's often some new synthetic material that he's really exploiting. The paper has been relegated to the part of an inexpensive and not too satisfactory carrier.

We see the resin makers frequently in our laboratories and many of them have paper laboratories, the better to learn the use of their products with paper. You papermakers we seldom see. Don't you think it would be a fine thing to get better acquainted with your converters—to learn just what we're trying to do with your paper?

We'll be very glad to know you better.

A SMALL BOILER PLANT REQUIRES GOOD PUMPS





MRV 2-Stage Motorpump

Low operating costs and a minimum of maintenance are as important for the feed pump in a small boiler plant as in a large one. That's why Ingersoll-Rand centrifugal boiler-feed pumps for small plants are built with the same care as the well-known I-R units for large, high-pressure stations.

There is an efficient, dependable pump in the line for your plant . . . Two-stage pumps, four stage pumps, (yes, even 30 stages if you need that many). There are pumps that will deliver as little as 5 gal. per min., others for any capacity you may require.

Careful selection of materials, balanced impellers, rigid pump shafts, deep stuffing boxes, and other big-pump features, assure long life and freedom from trouble.

Ask the Ingersoll-Rand engineer near you for literature on a pump to fit your plant. Some of those that might fit your needs are:

MRV: 2-stage Motorpump, pressures up to 200 lbs, capacities to 275 gal per min.

MRVH: 4-stage Motorpump, pressures to 260 lbs, capacities to 50 gal per min.

GT: 2-stages; pressures to 450 lbs, capacities to 2200 gal per min.

CNT: 4 to 8 stages; pressures to 800 lbs, capacities to 700 gal per min.

All sizes can be furnished with motor or turbine drive

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Paper Mill Operating Efficiencies

HAROLD H. BROWN
Consulting Chem. Eng.

The production of a paper mill is usually considered in terms of tons or pounds per day. However, the mill owner thinks of his production more in terms of costs, how much he makes per ton or per day, and what factors affect this cost and profit, which are only other ways of evaluating the efficiency of operations. Costs are broken down into such things as the cost of raw materials, labor, power, overhead, etc., each one affecting the total cost. These figures have been assembled under code numbers to give some idea of comparative costs in various mills manufacturing the same type of paper. But these do not always give what the mill owner or manager would like to know about how his mill compares with his competitors in any particular branch of costs.

In seeking to find some relation between the cost of labor and mill production between various mills in a district, use has been made of labor rates in these mills as against machine widths and production data as given in Lockwood's Directory. An attempt has been made to reach some common denominator as mills vary so much in size and in types of product. Labor is paid on an hourly basis, a machine will produce a certain amount per hour, and this product has a certain value per pound. These factors are common to all mills and it was believed that they should offer some basis of comparison.

Machine widths and speeds are a variable but production on an inch width per hour should be a fair basis of comparison. If this basis is taken along with the rate paid any type of employee, say a machine tender, and the value of the product of

TABLE I

Mill	Machine Width, in.	Production per Inch per Hour, lb.	Machine Tender Rate Per Hour, $	Machine Tender Rate Per Inch per Hour, $	Product Value, $	Product Value per Inch per Hour, $	Efficiency Factor *
1	332	2.8	0.76	0.3166	0.1184	0.2842	0.897
2	370	6.8	1.04	0.153	0.075	0.510	3.33
3	619	11.8	1.63	0.0873	0.055	0.649	7.43
4	898	10.2	1.16	0.1078	0.08	0.616	7.57
5	160	13.0	1.015	0.078	0.05	0.65	8.33
6	154	13.0	0.945	0.0727	0.06	0.78	10.73
7	496	16.8	1.29	0.0768	0.05	0.84	10.92
8	148	13.0	0.95	0.0727	0.06	0.846	12.60
9	86	17.4	0.99	0.0682	0.07	1.015	14.88
10	699	22.4	1.32	0.0591	0.04	0.896	15.16
11	157	10.6	1.04	0.0981	0.15	1.59	16.23
12	264	23.7	1.21	0.0512	0.045	1.07	20.83
13	220	22.7	1.08	0.0476	0.045	1.022	21.47
14	322	11.0	1.27	0.1155	0.25	2.75	23.81
15	1032	28.2	1.24	0.0441	0.045	1.269	28.77
16	110	26.5	0.96	0.0362	0.045	1.193	32.96
17	90	27.8	0.90	0.0324	0.05	1.39	42.90
18	102	28.6	1.13	0.0395	0.0625	1.79	45.25
19	175	38.1	1.06	0.0277	0.0375	1.429	51.59
20	353	47.2	1.27	0.0269	0.037	1.736	64.46
21	72	46.3	0.88	0.0190	0.035	1.621	85.31
22	134	43.5	1.26	0.029	0.0575	2.50	86.25
23	78	74.8	1.09	0.0147	0.03	2.244	152.65
24	90	74.1	1.07	0.0144	0.0375	2.779	192.98
25	168	74.5	1.48	0.0198	0.055	4.10	206.94
26	250	83.3	1.24	0.0149	0.0375	3.124	209.66
27	120	90.2	1.12	0.0124	0.0375	3.383	272.82

* This factor is obtained by dividing the value of the product of the mill per inch per hour by the machine tender rate per inch per hour.

TABLE II

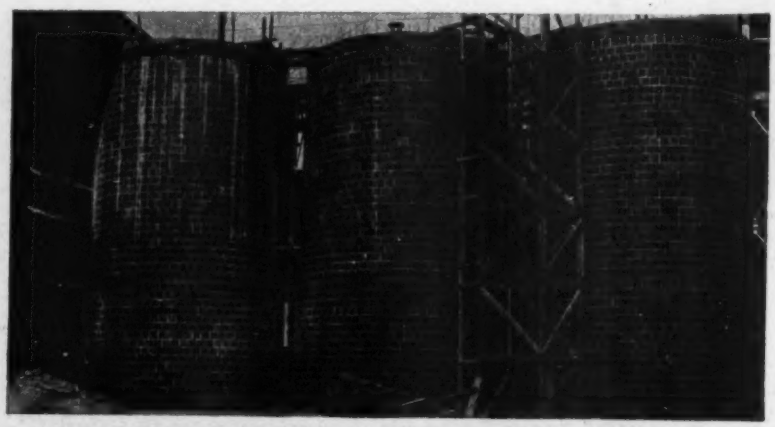
Mill	Machine Width, in.	Production per Inch per Hour, lb.	Labor Rate Average per Hour, $	Labor Rate Per Inch per Hour, $	Product Value, $	Product Value per Inch per Hour, $	Efficiency Factor *
1	469	6.8	0.872	0.128	0.0401	0.273	2.13
2	94	4.8	0.808	0.168	0.0805	0.386	2.30
3	84	5.1	0.766	0.150	0.0921	0.470	3.13
4	84	5.4	0.928	0.172	0.1059	0.572	3.33
5	525	5.3	0.808	0.152	0.1094	0.580	3.82
6	988	8.5	0.894	0.105	0.0816	0.694	6.61
7	196	11.2	1.088	0.097	0.0592	0.663	6.84
8	266	12.6	1.134	0.090	0.0520	0.663	7.34
9	171	10.9	1.228	0.113	0.1014	1.105	9.78
10	264	10.9	0.902	0.083	0.0753	0.840	9.89
11	370	14.9	0.941	0.063	0.0787	1.173	18.62
12	678	22.9	0.939	0.042	0.0764	1.727	41.12

* This factor is obtained by dividing the value of the product of the mill per inch per hour by the labor rate per inch per hour.

TABLE III

Mill	Machine Width, in.	Production per Inch per Hour, lb.	Labor Rate Average per Hour, $	Labor Rate Per Inch per Hour, $	Product Value, $	Product Value per Inch per Hour, $	Efficiency Factor *
13	260	5.2	0.921	0.1771	0.0567	0.295	1.7
14	418	3.9	1.008	0.2584	0.2768	1.080	4.2
15	154	11.1	0.847	0.0763	0.0563	0.625	8.2
16	508	13.2	0.870	0.0659	0.0647	0.854	13.0
17	183	14.5	0.982	0.0677	0.0800	1.160	17.1
18	856	19.6	0.786	0.0401	0.0719	1.409	35.1
19	284	25.4	0.897	0.0353	0.0588	1.494	42.3
20	356	28.2	0.915	0.0324	0.0544	1.534	47.3
21	520	31.3	0.894	0.0286	0.0470	1.471	51.4
22	163	28.0	0.781	0.0279	0.0585	1.638	58.7
23	102	28.9	0.877	0.0303	0.0634	1.832	60.5
24	244	32.6	0.769	0.0236	0.0556	1.813	76.8
25	381	56.4	1.192	0.0211	0.0378	2.132	101.0
26	308	50.3	1.017	0.0202	0.0506	2.545	126.0
27	134	44.3	0.879	0.0198	0.0575	2.547	128.6
28	936	72.0	1.053	0.0146	0.0358	2.578	176.6
29	168	58.9	0.948	0.0161	0.0580	3.416	212.2

* This factor is obtained by dividing the value of the product of the mill per inch per hour by the labor rate per inch per hour.



SEMTILE TANKS

The tanks shown above were designed and constructed by Stebbins of Semtile blocks which are hollow salt-glazed tile, cored in two directions to permit horizontal and vertical reinforcing. The tanks are easy to clean, prevent product contamination, and their durable construction insures long life.

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it's the SIDEWALL

of a V-Belt that Gets *All* the *WEAR* –

–That's Why the CONCAVE SIDE *is IMPORTANT!**

V-Belt
In Sheave
Clearly, it's the sides of a V-Belt that do all the gripping on the pulley and get all the wear against the sheave-groove wall. That's why longer life for the sides means longer life for the belt!

Every man who works around V-Belt driven machines knows from experience that it is nearly always the *sidewall* of a V-Belt that *wears out first.*

There is a perfectly natural reason why the wearing out starts with the sidewall—and here it is—

It is the *sidewall* of a V-Belt that has to *grip* the pulley and drive it. It's the sidewall that *transmits* to the pulley all the power the pulley ever receives. No other part of the belt gets anything like the *actual* wear the sidewall gets. Is it any wonder the sidewall of the *ordinary* V-Belt is the part that wears out first? Clearly, then, prolonging the life of the sidewall is the *one thing needed* to prolong the life of the belt!

The simple diagrams on the right show clearly why the ordinary, *straight-sided* V-Belt gets excessive wear along the *middle* of the *sides.* They show also why the Patented Concave Side *greatly reduces* sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight sided V-Belts can possibly give.

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Straight Sided V-Belt

FIG. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

FIG. 1A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

FIG. 2

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

FIG. 2A

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

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the mill calculated, some interesting figures are obtained. Such comparisons have been made on 27 different mills and have been correlated in Table I.

There are eight columns of figures: column 1 is the reference number of the mill, column 2 the total width of all machines in the mill, column 3 the production of the mill on a per inch per hour basis, column 4 the hourly rate paid the machine tender, column 5 the machine tender's rate on a per inch per hour basis, column 6 the estimated value of the product made on a pound basis, column 7 the value of the product on a per inch per hour basis, and column 8 which has been termed efficiency factor.

This factor is obtained by dividing the value of the product of the mill per inch per hour by the machine tender's rate per inch per hour. This gives a basis of comparison of the efficiency of different mills from the standpoint of the value of the product in relation to the dollar paid labor. It is both a measure of the efficiency of labor, of management, and of the mill.

The table has been arranged on the basis of the increasing value of the efficiency factor and bears no relation to the type of mill or the product made. Included in this list of mills are those which make light weights, specialties, kraft, boxboard, and groundwood papers.

It might not seem fair to compare different types of mills in this way. Consequently, information was sought on mills in different parts of the country making somewhat similar products, such as mills making light weight papers and those making kraft. Also, it was felt that perhaps a fairer basis of comparison should be the average hourly rate paid all labor. These figures for mills making light weight papers are shown in Table II and those making kraft in Table III.

In both of these the same relative differences are seen. In both there seems to be a continuing increase in the rate of production with the increasing efficiency factor but not proportionately. The increase in rate of production with increase in the value of the factor is not quite as consistent in the kraft mills as in those making light weights. Here the difference in production rate between mill 1 and mill 12 is about three and a third times while the difference in the efficiency factor is nearly twenty times, while in the case of the kraft mills, there is a difference in rate of production between mill 13 and mill 29 of eleven times and the factor for mill 29 is more than a hundred times that for mill 13.

In studying Tables I and III, there are four mills occurring in both, thereby giving an interesting comparison of the effect of the rate for one type of employee as against the average rate for all employees. These efficiency factors for these mills are:

	Efficiency Factor	
Mill	Based on Machine Tender Rate	Based on Average Labor Rate
1	10.73	8.20
2	45.25	60.25
3	86.25	128.6
4	206.94	212.2

While there is a difference in the actual figures, the factors are of the same general and relative magnitude. Number 3 might be considered an exception, but this is caused by a high machine tender rate, which pulls down the factor and a large quota of unskilled labor which lowers the average labor rate and boosts the value of the efficiency factor.

A natural reaction to these figures is to wonder why such a difference in the value of the efficiency factor. What influences this value? There are primarily three figures which influence it: first, the production per inch per hour; second, the price for which the product is sold; and third, the rate paid labor. As the factor is obtained by dividing the product value (per inch per hour) by the labor rate (per inch per hour) then this result, the efficiency factor, is actually the dollar value produced by labor with the tools available for the dollar received. This then gives a new measure of the efficiency of the mill and of the equipment of the mill along with the efficiency of the labor on a unit basis. Also, it can be considered to be a measure of the efficiency of the management as reflected in getting most out of the equipment available and in making a product that brings the highest possible value, which means the efficiency of the sales policy.

This cannot be considered a full reflection of costs as many elements are not included. The only actual out of pocket cost considered is the rate paid labor and such costs as raw materials, power, over-

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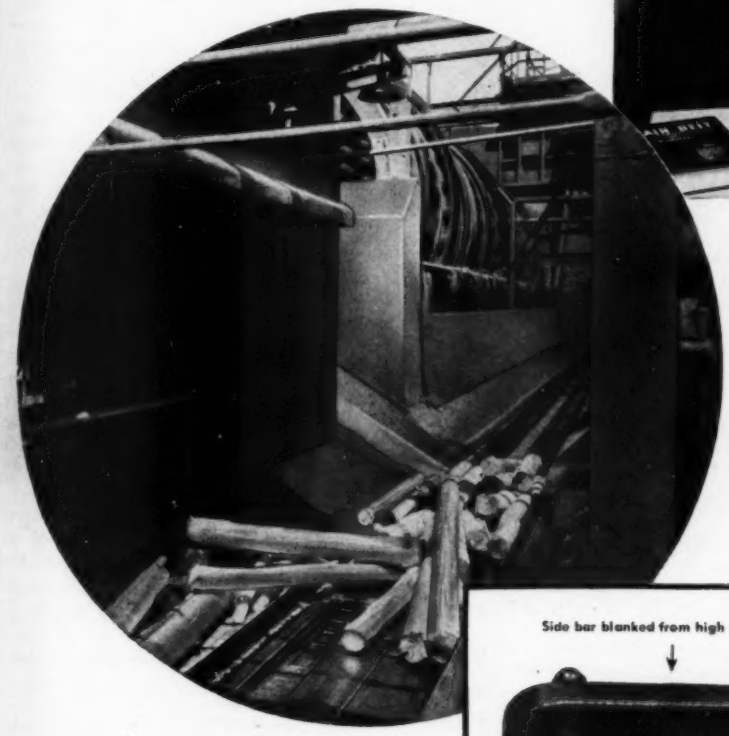

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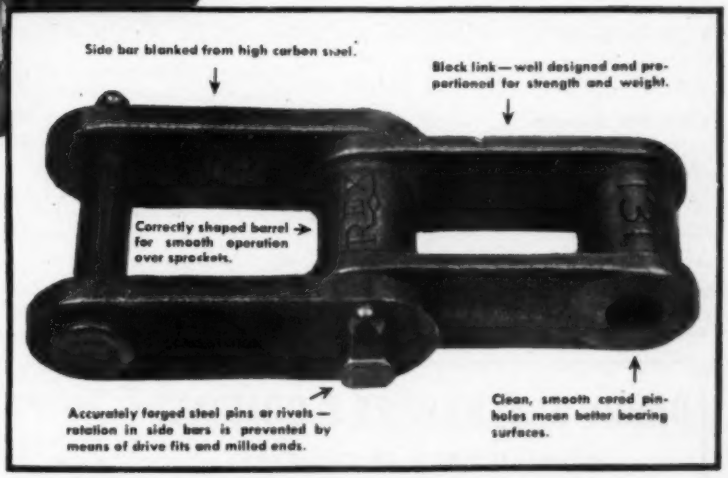
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Block link — well designed and proportioned for strength and weight.
Correctly shaped barrel → for smooth operation over sprockets.
Accurately forged steel pins or rivets — rotation in side bars is prevented by means of drive fits and milled ends.
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③ **NOTE THE DESIGN FEATURES** listed in the close-up at the right. Steel side bars are accurately punched for correct pitch and good drive fits. Milled flats on pin ends prevent the pin from turning in the side bar. Attachments are available for all types of conveyor work. For complete details, see your Rex man, or write us direct.

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head, capital investment, interest charges, depreciation, and total labor, which are included in the overall picture are not included here. Consideration of these on a similar unit basis might develop some very interesting comparative figures.

While no claim is made that this gives a complete picture of operations in different mills, it does give the management a new measure of plant efficiency, a measure of what the mill is doing on a production and labor dollar basis. It is a different approach to costs putting them on a unit basis and one that is similar in all mills. It gives a new idea of the value of labor indicating why some mills do not make money even though they pay a relatively low wage rate and why others do make money on a relatively higher wage rate. It is a partial answer to why some mills are more profitable than others. It can be used to show to management some things or give some ideas of what things they can do to improve the position of their mills.

The Case for Dilts Stock Preparation Systems

R. F. VOKES, Director of Laboratories
Dilts Machine Works, Division of
The Black-Clawson Co., Inc.

In order to argue or defend the case for Dilts Stock Preparation Systems, it is significant that we establish basic and fundamental conceptions of our particular approach to stock preparation problems. A very careful study of papermaking science has been made covering practically all phases of paper manufacture, and the result of these efforts has caused us to think of stock preparation not as a unit operation, but as a system of separate stages, the control of which the papermaker must have in order to attain optimum proficiency in his job.

Board Mill Systems:

Considering first the preparation of filler stock for a board mill, it becomes immediately obvious that in order to make a sheet of board from waste papers, we are confronted with the handling of fibers which have been refined, perhaps many times, sufficiently to form a sheet of paper. Hence, the refining or beating stage of the stock preparation systems is of lesser significance than the disintegration of the waste papers and removal of non-papermaking materials. For many years, the modified Hollander beater has been used to perform this function in combination with auxiliary equipment such as screens, trash wells, fork-type raggers, settling troughs and deckers.

To this field of stock preparation, Dilts has brought new methods incorporating new principles and providing for the continuous slushing of waste papers and attendant removal of rags, heavy trash, floating trash and continuously operated settling troughs, grit removers, centrifugal screens and high capacity thickeners. The new systems are geared to handle variable production capacities at equal efficiencies, and the major claims and advantages over the old style methods include power economy, maintenance and repair economy, manpower economy and most important of all, *facility of operation and control.*

Accepted stock from the waste paper systems of today has not been shortened or otherwise damaged, thus retaining all the available inherent strength properties. Of course, some fibers are excessively long for filler stock and some bits of paper are not always completely defibered. Hence, the final phase in board mill filler stock preparation simply involves fiber separation without cutting by Hydrafiners, and fibre length control by jordans.

Thus, we present equipment designed for performing each of the distinct functional requirements and combined in a system so integrated that economy and control team up to attain optimum performance.

Fine Paper Mill Systems:

Under this heading may be included the preparation of liner stocks for board mills, as well as the manufacture of any grade of paper not requiring prior removal of foreign trash from the raw material furnished. Perhaps eliminated from this grouping would be the manufacture of papers made from straw.

Raw materials for a stock preparation system include two main classifications: (1) Nonfibrous, (2) fibrous furnishes. Provision for handling the nonfibrous furnish is of equal significance to that of refining the raw fibers. For various types of paper manufacture, the nonfibrous furnish is introduced in different forms and in different stages of preparation of the fiber. Technical control of the nonfibrous furnish must be provided with equal consideration for the technical control of the development of the strength of the fiber in process.

The major phases of fine stock preparation systems generally follow in the order of (1) slushing, (2) hydration, and (3) cutting. For these separate phases, we provide the Hydrapulper for slushing the Hydrafiner for hydration and the jordan for cutting. Wherein batch type operation is employed, cycling-refining chests of the horizontal or vertical type are employed, and used together with the Hydrapulper for blending of the nonfibrous furnish.

Where slush stock is provided from a pulp mill, normally a Hydrapulper is not required, unless large scale blending or the occasional disintegration of wet laps is required. Broke from the paper machine may be added to a separate broke Hydrapulper or the same unit which disintegrates the raw stock Slush stock from the Hydrapulper controlled to the proper consistency and thoroughly blended with any non-fibrous furnish completes the first phase of the system operation.

The term "hydration" as generally understood by the papermaker refers to the slowing up of the stock, thus exhibiting a wetness or slippery feel to the hand. Hydration attends both the bruising or brushing and the cutting of fibers. In the instance where a Hydrafiner is used, however, hydration attends a minimum of cutting, and the result is a distinct control over the development of the maximum inherent strength of the pulp prior to the required cutting for proper sheet formation. Thus, the papermaker is presented with a new control over a stage in the strength development of his pulps, which has heretofore been economically unattainable in commercial practice.

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Following the hydrafining of pulps, we generally proceed to jordaning except in special cases where cutting is not required. As stated above, hydration attends cutting and with pulps having an exceptionally high inherent strength, the cutting action of the jordan also provides a control over the final degree of strength development to produce such properties as high porosity, extremely high Mullen at the expense of tear and a maximum hydration such as is required for glassine papers.

Therefore, we rest the case for a *system* for stock preparation. We have presented the papermaker with the tools and instruments specifically designed for his job. It is henceforth possible for him to control each phase of the stock preparation procedure, and adapt the equipment operation to meet the variables with which he is confronted daily—particularly in a specialty mill.

Abridgments in this section are from papers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 25-28, 1946.

A Stock Inlet for Paper and Paperboard Machines

S. A. STAEGE, Consulting Engineer
The Black-Clawson Company

The stock inlet does not make the sheet but it is one of the most important contributing factors in the sheet formation. A suitable sheet is necessary in a fourdrinier machine and proper vat conditions in the cylinder machine but without a uniform distribution of uniform stock, a level, well-formed sheet cannot be made.

If the stock is not uniform in consistency, freeness, and fiber distribution, the sheet will not be uniform in weight, strength characteristics, and appearance and will not present a level printing surface.

If there are cross currents and varying velocities in the headbox with eddies and turbulence, the slice cannot correct these faults and produce a level sheet.

If the stock is not brought into the headbox or vat uniformly, the use of baffles, perforated rolls, and similar devices cannot completely correct the condition. They can partially distribute the flow but cannot produce the uniformity of conditions necessary for the best formation.

If stock is brought in from the side and flows all the way across the machine, means are available for distributing infinitely small portions of whatever type of stock is flowing to every increment of space across the entire width of the machine so that exactly the same kind of stock of the same consistency and freeness is distributed all the way across.

Straightening vanes for changing the direction of flow of the stock from right angle to parallel with the machine direction are not permissible for practical reasons as well as theoretical. However, by utilizing cross flow from both sides of the machine with parallel tapered ducts and a common slot orifice, the direction can be changed from cross flow to parallel flow without the use of straightening vanes of any kind. This is the principle employed in the so-called Hydronamic stock inlet, the name being derived from the two words hydro and dynamic.

By employing tapered ducts extending across the machine with stock extraction all the way across, the velocity in the ducts is maintained the same at all points, a hydraulic condition necessary for uniform pressure differential across the slot orifice and uniform flow throughout the orifice throughout its entire length.

Were there only one cross flow tapered duct employed, the discharge through the slot orifice would have a somewhat diagonal component because the flow in the duct is at right angles to the machine direction. However, with the stock in the two tapered ducts flowing in opposite directions and discharging through the same common slot orifice, the two thin streams of stock merge in the slot orifice into one homogenous stream flowing parallel to the machine direction and with uniform velocity throughout for any given total volume of flow. It will be observed, therefore, that the initial slight angularity of the two streams of stock caused by the cross flow in the tapered ducts is

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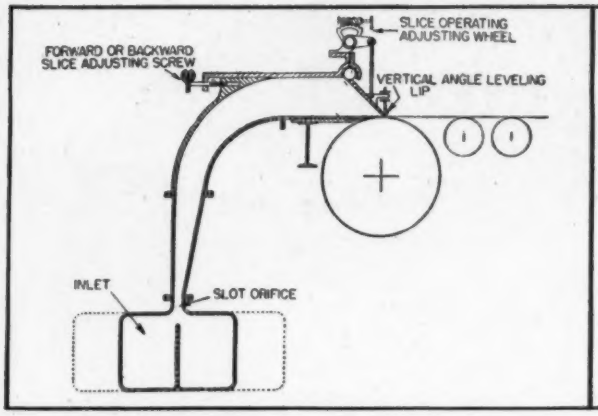


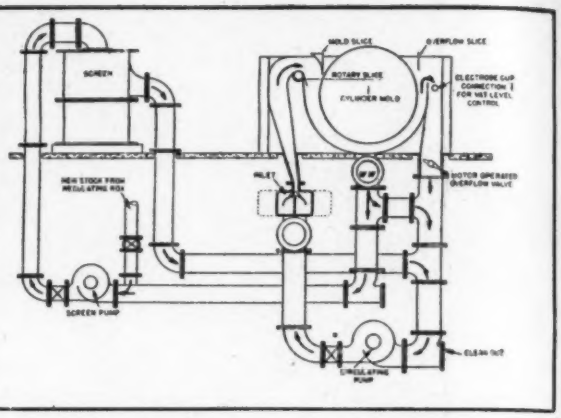


Fig. 1 (left)—Pressure inlet for high speed fourdrinier machines . . . Fig. 2 (right)—Inlet installation on an overflow-type vat

compensated and neutralized by the merging of the two streams.

It should be pointed out, however, that the degree of angularity of the two streams of stock from the two tapered ducts is small in any event because the stock velocity in the tapered duct is small compared to the stock velocity through the slot orifice. As a matter of fact in conventional design, the proportions are such that the velocity head resulting from the velocity in the ducts is not more than approximately 10% of the velocity head resulting from the velocity through the slot orifice. As the velocity in the tapered duct is relatively low, seldom more than 3 feet per second, and as the stock velocity through the slot orifice may be of the order of 6 to 10 feet per second the initial angularity of the two flows is very slight, but in any event, the combining of the two flows in the orifice completely converts the discharge from the orifice to parallel machine direction flow.

From the inlet slot orifice a flat tapered duct the full width of the sheet extends from the orifice to the vat circle, the slice or open headbox, as the case may be, slowly decelerating the stock velocity as it leaves the slot orifice until it reaches its immediate destination in a smooth flowing stream.

The flat angle taper from the slot orifice onward of venturi characteristics assures a minimum degree of turbulence and provides the most favorable flow characteristics for sheet formation.

A small amount of stock recirculation is provided from the small end of each tapered duct discharging into the large end of the adjacent tapered duct. This eliminates any dead ends where stock fibers might accumulate.

In the design of the inlet, the common wall between the two tapered ducts, which constitutes a diagonal partition in the rectangular inlet box, does not extend all the way to the top of the duct but terminates an inch or two from the top depending upon the size of the inlet, so that there is free communication between the two ducts throughout their entire length providing ample opportunity for the combining of the two jets of stock into one homogeneous stream.

The flow characteristics of the inlet are not critical. The amount of stock entering each of the two tapered ducts does not have to be accurately balanced and moderate differences in flow between the two ducts have no detectable effect. Furthermore, the stock velocities in the ducts and in the slot orifice can be varied over a wide range without appreciable effect in performance. For this reason, it has been found necessary to make the slot orifice adjustable for any ordinary requirements, all of which lends itself to simplicity of design and economic desirability.

While this inlet is a most desirable feature for any paper machine, it lends itself especially well to the pressure inlet and slice, with the elimination of the large cumbersome headbox which becomes such a monstrosity especially in high speed machine. Not only does the head-works structure with the pressure-type, inclosed inlet become relatively insignificant but the stock is not given time to flocculate and stagnate before reaching the wire. With reasonable precautions against the entrainment of air into the stock and with proper design, air and foam problems ordinarily encountered with open headboxes can be made relatively non-existent.

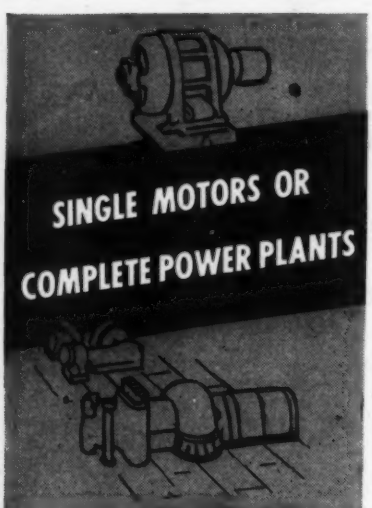
Cascading of stock always entrains air causing foaming and undesirable disturbance of the fibers when the air is released.

A streamlined tear drop shaped valve in the pipe connection leading from the screen box to the inlet provides a means by which the stock level in the screen box can be maintained at the proper level, to prevent cascading. For any required level in the headbox or pressure at the slice, the drop in pressure or head is taken in this throttling valve. The operation of the valve can be manual if desired, but if automatically controlled will maintain the stock level in the screen box without any attention for all operating conditions.

Where machine screens are not used, the stock is pumped directly to the headbox or slice, or cylinder machine vat, and the volume of flow is controlled by adjusting the pump speed or throttling the discharge. For any given slice opening the head can of course be controlled by adjusting the flow, or for a given flow the head can be controlled by adjusting the slice opening.

Another very satisfactory arrangement is to have the screens discharge to the suction side of the pump where the screened stock is combined with any by-passed white water, and is thoroughly mixed in the pump before being pumped to the headbox or slice or the vat.

The inlet is generally constructed of Monel or stainless steel which lends itself to smooth contours and rounded corners and with freedom from corrosion. It is also provided with suitable streamlined cleanout doors. Cast iron construction for the inlet has been used but is much heavier.



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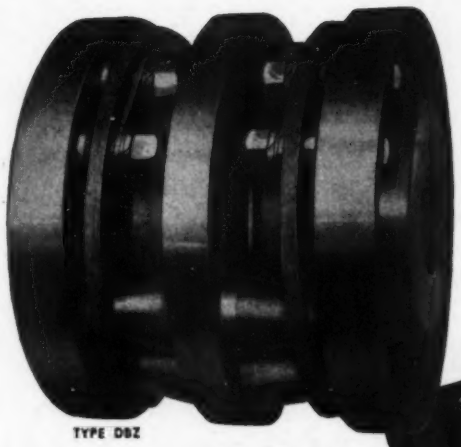

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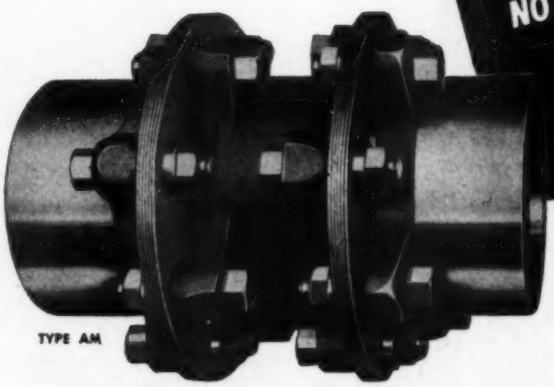

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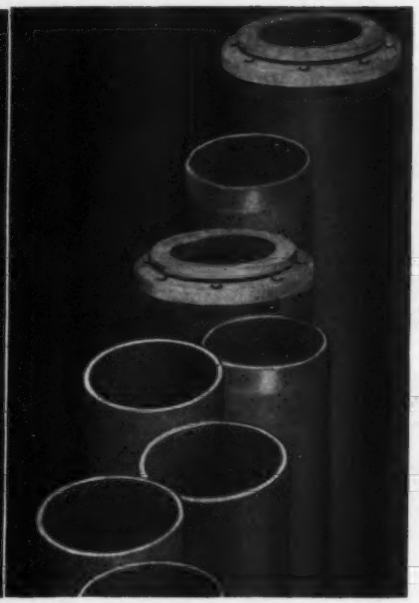

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The Rapid Measurement of an Index of Fiber Length

Part I—Description of the Test Method

R. DE MONTIGNY[1] and P. ZBOROWSKI[2]

The present investigation arose out of the authors' dissatisfaction, which appears to be widely shared, with the tools at present at the disposal of paper mill operators to guide them in preparation of stock and in the rapid evaluation of stock quality. These tools at the present time are limited to a variety of instruments primarily designed to measure drainage characteristics and useful in allowing an estimate of stock quality only inasmuch as the stock has been prepared under conditions much more constant and accurately controlled than is possible in most fine paper mills today. It is common knowledge that the preparation of successive batches of stock to a constant drainage measurement figure is not an infallible guarantee of unvarying quality of the stock as gauged by the properties of the paper made from it.

The authors felt that supplementing such drainage measurements with a rapidly determinable quantitative index of fiber length would materially assist operators in controlling stock preparation.

Present methods for estimating fiber length fall into two categories, optical and mechanical. Both are open to the objection that the time required to carry out measurements is much too long to make them of any use for routine control. Optical, that is microscopic, methods are subject to the further criticism that the evaluation of a *weight* average fiber length involves the making of assumptions concerning the relationship between fiber length and weight which are not above question; moreover such measurements do not take into account that portion of the pulp whose length is inferior to some lower limit, usually of the order of 0.1 mm., which is fixed by the equipment available and by the skill and patience of the operator. Mechanical, that is screen classification, methods give data which are in the form of percentage weight distribution between screens of arbitrarily chosen mesh and which therefore do not lend themselves to ready comprehension or use. Conversion of such data into a weight average length hinges on the microscopic determination of the average length of each isolated fraction. This can be done quite accurately for the intermediate fractions and it is probable that the lengths of these intermediate fractions is reasonably constant for a given type of pulp regardless of its degree or manner of refining. The finest fraction, that which is lost in the determination and whose weight is found by difference, must be assigned as estimated value. The average length of the fraction retained on the coarsest screen is not beyond question even with wood pulp where there is an upper limit fixed by the very nature of the wood fiber; at the present writing it is not definitely known whether the average length of the fraction decreases with increasing severity of refining. In the case of rag pulp, where no maximum exists, it is highly probable that the average length of the coarsest fraction does change with refining.

In their search for a method which would be as free as possible from these shortcomings, in the sense that it would provide a rapid and direct measurement without the necessity of making either assumptions or subsequent calculations, the authors have gone back to a very old qualitative practice used particularly in rag mills which consists in observing the quantity of fiber caught by a blade drawn through a suspension of fibers in water, the obvious deduction being that the more fiber withdrawn by the blade, the longer the fiber must be.

The text which follows is in the nature of a progress report and is not intended to represent a completed investigation. Since the data presented in a companion paper indicate that the method can give useful information in practice, the findings are, therefore, reported in their present stage in the hope that other investigators may deem them of sufficient interest to warrant further study and that from such additional work the value or worthlessness of the method may be established much more rapidly than by investigation in a single laboratory.

EXPERIMENTAL

Apparatus

The apparatus consists of the standard

(1) Technical director and (2) research physicist, Rolland Paper Company.

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 21 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS

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HIGH LIGHTS:

Wisconsin is the third greatest producer of paper in the United States, according to the latest available Census reports, but was so close to Maine that their positions resemble a "photo finish" at the Kentucky Derby.

The first mill, started by Ludington & Garland in Milwaukee about 1846, no longer exists; in the century since, Wisconsin has become a papermaking empire in itself. Its natural resources — forests and rivers were unexcelled for pulp and paper requirements. There is probably no other state in which so wide a variety of paper and paper products is obtainable. Everything from the lightest tissues to heavy paperboard, from finest rag writing paper to ground wood grades of paper are made. All sorts of paper for packaging and for household uses are made in quantity, together with many specialties from cellulose fibres. Book paper history has been made in Wisconsin, too, for here the first really successful machine coated paper was produced. Total tonnage of all kinds now exceeds one million tons per annum.

Through the imagination and leadership of Wisconsin manufacturers has come the establishment of America's only graduate school of paper technology, the Institute of Paper Chemistry, at Appleton, established in 1929. This has now become a national institution, numbering among its Trustees, prominent paper manufacturers from various states.

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British sheet machine in which the grid plate has been replaced by a bronze ring of the same diameter and depth and ¼-inch wide and in which are fixed vertically 27 equally spaced stainless steel blades ¼-in deep and 1/32-inch thick, providing a total blade length of 3.482 meters.

Procedure

The sheet mold is clamped in place and the water turned on gently. When the water has reached above the blades and while it is rising in the mold, an appropriate volume of stock containing 10.0 gram of moisture-free pulp is poured in and the liquid in the sheet mold brought up to the mark. The liquid is stirred as when making a handsheet but with the old type stirrer without vertical vane, care being taken not to produce a swirl. After a few seconds' pause, the dump valve is then opened to its full extent.

After drainage, the mold is opened, the blade-grid is removed and overturned in a pan containing a little less than ¼-inch of water. Practically all the fibers deposited on the blades will remain in the water when the grid is lifted out and any fibers still clinging to the blade are washed off by the fine jet of water. The operation is performed three times and the collected fibers mixed together, filtered on a weighted paper on a Buchner funnel, dried at 105 c. and weighed after cooling in a tared closed container in a desiccator. One-third the weight in grams is reported as "Fiber Length Index."

For routine work the method is modified as regards the drying of the caught fibers for the sake of speed. The filtered fibers on the paper are placed on an electric hot-plate and pressed with an electric iron, the temperature of both of which is regulated so as to give as rapid drying as possible without scorching. By this abbreviated drying method, and omitting the cooling step in the desiccator, an operator can obtain a result on a stock of known consistency in 12 minutes.

Reproducibility of Results

Determinations were made using the same pulp beaten to two different degrees. Each pulp was tested first by making single determinations, that is by catching fibers on the blade-grid from a single 10-gram sample, then by making three separate determinations and combining the three portions of fibers caught from suspenion. The long-fibered pulp was further tested by making five determinations.

The results show that the precision attained in single determinations with long-fibered pulp is insufficient for reliable work, that that resulting from triple determinations is adequate for all but very exact work and that only small advantage is gained by going to quintuple measurements. The method was, therefore, standardized on triple determinations.

Effect of Weight of Fiber In the Sheet Mold

Measurements were made with varying quantities of fiber in the sheet mold.

The deposits on the blades ranged from very light and uniformly distributed ones to heavy ones bridging across the blades. In spite of this, the variation of the weight of deposit with variation of the total weight of fiber is surprisingly regular.

It is obvious that determinations with very large weights of fiber in the sheet mold should not be considered since the fibers lose to a considerable extent their freedom of movement and have increasing opportunity to tangle with each other and form clots; also, with increasing weights of deposit on the blades, the latter cease to function as such and there is increasing probability that fibers are caught not by the blades but by previously deposited fibers. It is obvious that ideal conditions lending themselves to a theoretical analysis would be met only with weights of fibers in the sheet mold approaching zero. However, in order to obtain reasonable weights of deposit, a compromise had to be made and the figure of 10 grams was arbitrarily chosen as still giving a manageable weight for very short pulps without excessive amounts for very long fibered stock.

Effect of Consistency in Sheet Mold

A series of measurements were made using a constant weight of 10.0 grams in the sheet mold but varying the total volume so as to change the final consistency in the mold.

The results indicate that the effect of consistency becomes pronounced only above 0.2%.

Effect of Rate of Outflow

The influence of the rate of outflow was briefly studied by inserting in the drainage pipe orifices of appropriate diameters and determining the fiber length index at three different rates of flow for four different pulps.

The results produce a family of curves ranging from very slightly concave for the very highly refined and very short rag stock to markedly convex for the slightly beaten long-fibered alpha pulp.

The long drainage time gave the obvious advantage of heavier deposits on the blades. However, this was abandoned for two reasons. The first was the fact that theoretical considerations required conditions of turbulent flow between the blades and that an examination of the flow conditions revealed that even at the highest drainage rate obtainable, flow was only just at the borderline between stream-line and turbulent. The second reason was that if a low rate of flow was adopted, the necessity arose of either working at constant temperature, an impractical stipulation, or devising correction tables which threatened to be an extremely tedious procedure.

Effect of Temperature

A few measurements were made to investigate very briefly the effect of temperature with the full opening of the dump valve and consequently the highest possible rate of drainage.

The results show that up to 25 C., the effect of temperature is negligible. Since mill water supplies seldom exceed this figure, there appears to be no need for temperature control or corrections.

Effect of Blade Cross Section

Before the final blade-grid was constructed, trial grids were constructed containing only five blades. Three grids were made, one with the upper edge of the blades bevelled and sharpened, one with the upper edge rounded off and one with the blades cut square; all blades were of the same thicknesses, 1/32-inch.

Measurements were made with a bleached sulphite beaten to three different degrees.

Although there was a tendency for the rectangular blade to collect slightly higher deposits, the differences between the three types of blades appear neither systematic nor significant. The rectangular blades were, therefore, chosen for ease in construction.

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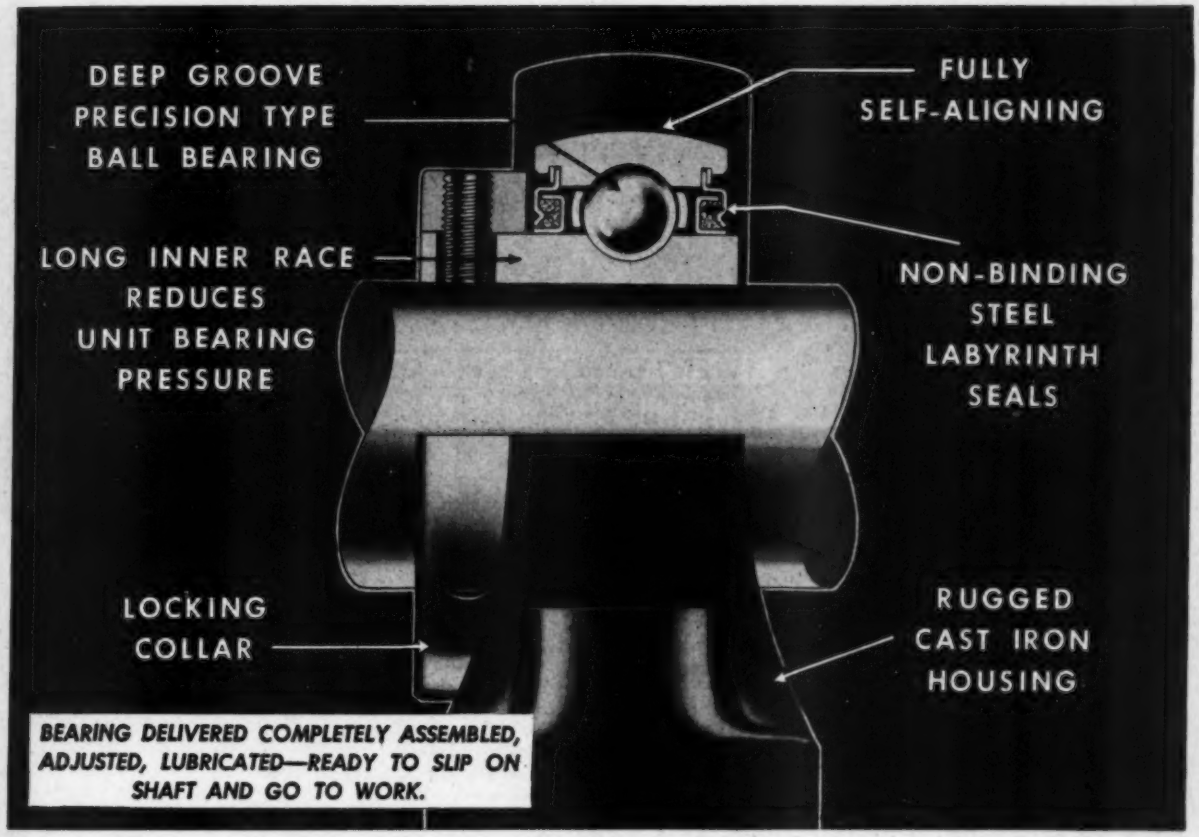
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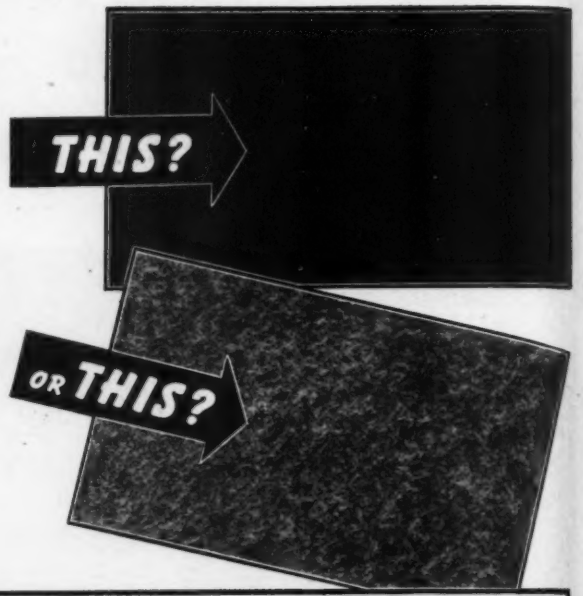

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Experimental

With a view to gaining indirectly further insight into the mechanism of the test procedure, the following experiments were performed.

Two pulps of obviously widely differing fiber length were mixed in varying proportions and the fiber length index of each mixture determined. The results are shown in Table 7 and Figure 4.

To confirm this finding, three different pulps were again taken and the fiber length indices determined and calculated for different mixtures.

Calculated and determined values agree within experimental error, therefore confirming the form of the equation derived.

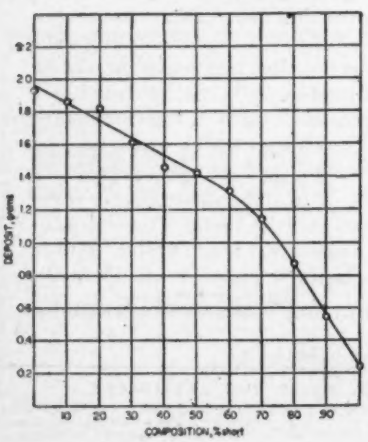


Fig. 4 (left)—Relation of composition of mixture of two pulps on weight of deposit

It follows from this that if the weight of fibers caught by the blades is a measure of average fiber length then this weight is a function not of fiber length but of its square root.

In the hope of obtaining direct, even though only approximate, evidence that the test method gave results which were related to fiber length, a number of pulps were prepared, their fiber length index measured, and the pulps classified with the Johnston classifier. From the classification figures and the values supplied by the Pulp and Paper Research Institute for the average lengths of the fractions, average lengths by weight were calculated using the lengths of the fractions, their squares, and their square roots.

There is still doubt concerning the constancy of the average length value of the coarsest fraction which may quite possibly decrease with increasing refining of the pulp; this point is at present under study at the Pulp and Paper Research Institute. Moreover, no average length value may be assigned in the case of rag pulps where no maximum fiber length exists as in the case of wood pulp.

Another effort was made to determine the nature of the relationship between fiber length index and fiber length. A bleached sulphite pulp was beaten to three different degrees. Each sample was then treated exactly as in the fiber length index determination except that the fibers caught on the blades were not filtered and dried out fibers accumulated until sufficient was available to run a screen classification test. These selected fibers and the original pulp were then classified.

Classification of the caught fibers was calculated using the average lengths of the fractions, their square roots, and their squares. The results lend some support to the conclusion arrived at as a result of the experiments on mixtures of pulp described earlier that the fiber length index should be a function of the square root of fiber length.

A companion paper reports the use which has been made of the fiber length index test method in establishing relationship between it and the paper-making qualities of pulp and indicates that the method shows promise of being useful in everyday paper-mill practice.

TABLE 7

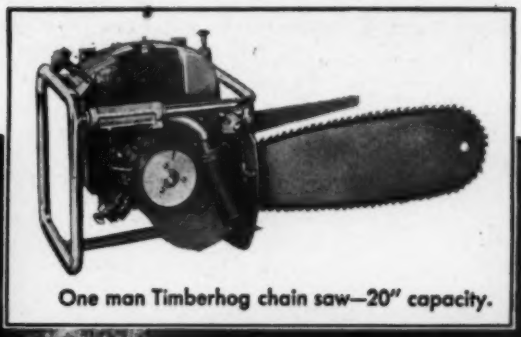
Pulp No. 1, %...	100	90	80	70	60	50	40	30	20	10	0
Pulp No. 2, %...	0	10	20	30	40	50	60	70	80	90	100
F.L.I.	1.93	1.86	1.82	1.61	1.46	1.42	1.31	1.14	0.87	0.54	0.23

The curve through the points is of the form.

$$F = \sqrt{x F_1^2 + (1 - x) F_2^2}$$

where F = Fiber Length Index for mixture
F_1 = Fiber Length Index of pulp No. 1 alone
F_2 = Fiber Length Index of pulp No. 2 alone
x = Fraction of pulp No. 1 in mixture

SPEED



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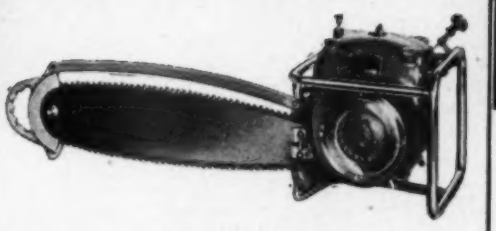

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The pulpmaker usually starts his particular work by storing the wood material received.

Wood, being susceptible to change in storage, will modify its characteristics with time because of conditions of such storage. Some changes such as conversion of resinous substances to forms easily handled by the processing are desirable; other changes such as excess drying and shrinkage and rotting might be anything but desirable.

Proper care of wood in storage is important.

The amount of wood dirt per unit volume of wood is an important item and controls to a great extent the degree of cleanliness which can be economically imparted to the finished pulp.

Chipping is another wood preparation operation of great importance. It has lately been the subject of considerable study. Chip size and its influence on penetration by the cooking acid as well as injury to the wood material by crushing in the chipping operation have been studied.

Effects of the wood preparation procedure are felt throughout most of the process and might be particularly watched for in their influence on the cost and strength, and cleanliness characteristics of the resultant pulp.

When the pulping reaction and operating details are considered a great variety of possibilities are found to be available and affect pulp properties in various ways.

It is necessary to consider:

1. Character of wood material as to species, growth conditions, change of properties in storage and cleaning
2. Chip size and its uniformity as affecting penetration by liquids
3. Temperature of acid as it affects penetration and heat economy as well as time saving in the reaction schedule
4. Ratio between wood and acid as such and density of chip charge as affecting the efficient use of the digester vessel
5. Concentration of acid both in regard to free SO_2 and combined SO_2 and their influence on the various pulp properties
6. Changes in concentration of acid due to wood moisture and steam, when direct admittance of steam is used
7. Changes in concentration of liquid by removal of liquid and gas during the cooking cycle
8. Temperature and time schedules
9. Pressure schedules and their effect on concentration and hydrostatic effects
10. Volume changes by removal of liquors
11. Procedures used in removal of cooking liquids
12. Procedures used in removal of finished pulp

For pulps of low cost, relatively good strength, and medium speeds of hydration, it may be well to use direct admittance of steam to the digester, but it is advisable to apply forced circulation of the cooking liquid to insure uniformity of product.

The same arrangement would appear a satisfactory arrangement for pulps of high cellulose content.

When cooking for strong pulps using low temperature, with the extended time necessary, it appears best to use indirect heating which gives better control of dilution factors and forced circulation of the cooking liquids which insures uniform heat distribution as well as uniformity in liquor concentration.

For pulps where a limited, selective removal of wood material is desired the horizontal type of digester with indirect heating but equalization by convection is also applied.

Whether the vertical digester with indirect heating and forced circulation with improvements in conditions of emptying will be able to produce as good or better pulp than the old Mitscherlich type has still to be proven.

In regard to reaction and operating procedures in the digester operation all know of the influence of kind and condition of wood materials, acid concentrations, temperature schedules; pressure schedules, etc., but the time or opportunity might not have been had to analyze the possibilities of correcting pulp characteristics by adjusting such conditions.

It has been found that good pulp calls for good, sound wood.

The maximum temperature during the cook is of much importance and even slight corrections might be found of value in adjusting for wood of inferior quality.

Years of observation have convinced operators that for a high tearing test it is necessary to cook out fairly well, for a high bursting strength one must work towards undercooking. If both characteristics are required in the same pulp, the maximum temperature is lowered with, of course, consequent loss in the speed of the reaction.

Speed of hydration has been found, in general, to be benefited by the same conditions which improve the bursting and tensile strength characteristics of a pulp.

It is interesting to observe that similar relationships seem to exist when dealing with bleaching problems when chlorination is used as a first stage.

The control of the acid composition should be assigned to the acid plant, and equipment should be available to maintain such control without juggling the digester operation.

New ideas in sulphur combustion have increased the strength of gas produced and also improved the quality of the gas by lowering the amount of sulphur trioxide produced. Improvements in cooling equipment and addition of auxiliary absorption equipment and use of storage tanks under pressure have made it possible to use stronger acids as well as acids at elevated temperature in charging the digesters.

The problems of recovery of excess gas and liquids from the digester operation are closely related to the operation of the acid plant and pulp properties are dependent on the acid plant operation both

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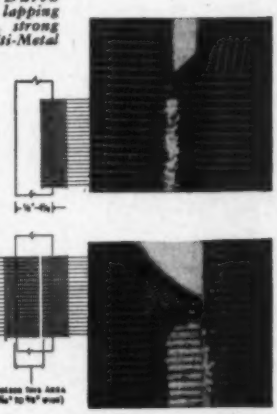

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Pulp Thickeners	*Monel Backing Screens*	*Monel Top Screens*
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SAVE-ALLS	10, 12, 14 mesh*	50, 60, 70, 80 mesh (12 x 64 corduroy cloth used without backing screen)
Unbleached Stock Washers		
VACUUM FILTERS	10, 12, 14 mesh*	30, 40, 50, 60 mesh
DECKERS AND CYLINDERS	12 x 64 mesh Monel and 14 x 88 mesh Monel corduroy cloth used without backing screen	
*Alkaline Bleached Stock Washers***		
VACUUM FILTERS	10, 14 mesh*	40, 50 mesh
BOARD MACHINE CYLINDERS	10, 12, 14 mesh	30, 40, 50, 60 mesh
BEATER WASHER		40, 50, 60 mesh
Lime Sludge Filters		
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CLAY AND COLOR STRAINERS	150, 200 and 325 mesh Monel	

*10 mesh recommended for increased open area and drainage—**For chlorinated, acid-bleached stock washers Type 316 nickel-chromium-molybdenum alloy steel recommended.

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due to the fundamental acid plant operation and to the handling of the recovery as applied to the digester room.

The amount of combined sulphur dioxide is primarily controlled by the acid plant, the free sulphur dioxide to a great extent by the digester recovery operations.

The amount of combined sulphur dioxide in the acid influences the speed of the cooking reaction and also the color properties of the resultant pulp; high combined sulphur dioxide favors bright color of the unbleached pulp; it also helps to protect the wood against over cooking with the consequent loss in pulp yield.

The pulp as it leaves the digester may be either well cooked or mildly cooked. These terms are, of course, relative expressions comparing the pulp to some agreed on standard differing with different plants and uses to which the pulp is put. There is the expression "soft" and "hard" sulphite pulp and some general indications of the pulp characteristics can be given by using these expressions.

A comparative table of what general characteristics might be expected would read about as follows:

	Well Cooked or Soft Pulp	Under (Mildly) Cooked or Hard Pulps
Chemical purity	Good	Poor
Strength properties		
Bursting strength	Poor	Good
Tearing strength	Good	Poor
Cleanliness	Good	Poor
Bleach consumption	Low	High
Speed of hydration.....	Slow	Fast

The pulp after discharge from the digester must first be rid of adhering cooking liquors and this is done by draining and washing the pulp.

Various methods are employed in modern practice. They all aim at removal of chemical impurities including emulsified resinous compounds or "pitch" with least possible loss of usable fiber. Recent work in pulp washing procedures has encouraged the removal of short fibers as being carriers of pitch and besides of little value to the pulp consumer.

Vacuum washers with their washing of the pulp in a relatively thin mat have been introduced in some plants of late and warm water, although costly, has found some favor.

Where high chemical purity is desired, it may be found more practical to obtain it by cooking the pulp softer than by applying expensive washing to a relatively hard pulp.

For separation of fiber bundles and the removal of solid impurities, various combinations of settling, screening, and centrifugal processing are employed.

Pulps being heterogeneous masses of cellulose fibers of various sizes and shapes do not respond in the same manner to screening operations; the cleanliness desirable or economically possible also varies with different types of pulps whether soft or hard.

Flotation or riffling is a common means of removing matter of a specific gravity greater than that of cellulose fiber and does fine work on heavy material such as common inorganic impurities encountered in the sulphite process.

Impurities of a specific gravity close to that of the cellulose fiber must be removed by straining or screening through holes or slots.

The appearance of such impurities in the pulp slurry can be traced back to wood properties, wood cleaning operations, and the degree of digestion to which the wood material has been subjected.

Screening proper is a size separation process. With a fiber mass containing particles of various sizes, one would expect to have the possibility of classifying such sizes and to produce pulps of predetermined fiber distribution. Some work has been done along these lines and pulps are now produced under the name of "fractionated pulps" where the mass has been enriched in its contents of long fiber usually by the removal of short fiber. The removal of excessively short, pitch carrying fibers must be considered again; whether an increase in long fibers or exceptionally long fibers as such are an advantage to the customers is a question open to debate. Fiber analyses of some pulps recognized as fine papermaking pulps have shown that they had a shorter average fiber length than other pulps not as well received by the papermaking trade.

Dewatering operations are always necessary in pulping processes but to various extents. The self-contained plant in most cases uses its pulps in slush form of 3 to 15 per cent consistencies. Where the pulp has to be transported over long distances it is often converted into dried sheets. Improper drying has been found to affect the cellulose fiber and cause decrease in strength properties of resultant paper products.

Dewatering and particularly such operation with the use of wire screens are common pulp mill practices. Such processing can prove costly if due precautions are not taken in the proper utilization of resultant pulp waters with their content of stray fiber. The occurrence of such fiber and "white waters" is an important problem both in the effects its reuse has on cost characteristics of the pulp and on other properties.

Pulps obtained by processing discussed so far in this paper possess quite light color and are satisfactory for many purposes.

If, however, brightly colored or white papers are called for, the unbleached sulphite pulp must be further processed for improvement in its color characteristics. For the production of such pulps, the common practice used to be cooking of the wood to a relatively soft pulp which would readily respond to oxidizing bleaching employing hypochlorite solution.

Modern mill operation employs a slightly different procedure.

With the introduction of the use of elemental chlorine as a first stage in the bleaching process, it has been found that the chlorination stage can be treated as a continuation of purification produced by the sulphite cooking process.

The practical consequence of this has been that pulps now often are produced using milder sulphite cooking procedures with the final removal of chemical wood substance by treatment, at room temperature, with chlorine introduced in pulp suspensions at low consistency.

It is now possible to bleach harder pulps than formerly was the case with gains in strength properties as well as yields.

It is interesting to observe that some late investigators of the bleaching process have tried to explore changes in the cellulose fiber as such when subjected to bleaching. The author believes that such research should be encouraged to include also changes produced by the sulphite cooking process.

In some cases, it has been found practical to forego the use of a chlorination stage in bleaching to take advantage of the more severe treatment of pulps by oxidizing bleaching at elevated temperatures. A lowering of the dirt count by such a procedure forces, however, a sacrifice of other characteristics of the pulp particularly strength and hydrating properties.

Pulps for chemical conversion are further purified and to an extent where their characteristics as sulphite fiber pulps are submerged in favor of their characteristics as cellulose substance.

Cost is a very important item to consider. The cheapest pulp is not always the cheapest fiber raw material for the papermaker to use.

The material which is isolated from wood in the sulphite process amounts to about one-half of the weight of the wood. The rest is usually sent to the sewer.

The safest solution of this waste problem for the sulphite pulping industry as a whole at this time appears to be the conversion of this waste material into fuel usable by the producer himself without his entrance into the organic chemical markets.

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utilization of sulphite waste liquors, the presence of calcium as the base in the original cooking acid has been found to cause technical difficulties hard to overcome.

Recent work on this continent in trying to replace the calcium with magnesium or ammonium bases has given interesting results, and either base might in the future help to solve the problem of increased utilization of the wood material with a decreased cost of pulp manufacture.

No definite information seems to be available in regard to the type of pulp brought on the market by sulphite pulp manufacturers, when such pulps were first produced. There are reasons to believe, however, that it was papermakers pulp of medium fiber length produced from spruce wood.

There are now several general types, usually described by the uses to which they are put or the wood material and process used in manufacture. Such terms are found as: news, bond, book, strong, rayon, and spruce, hemlock, and hardwood sulphites.

It might be possible to consider classifying pulps according to average fiber length and to their responsiveness to "papermakers hydration." Describing a pulp as long, medium or short-fibered and fast, slow or non-hydrating will give interesting information because of the fact that the hydrating property of a pulp is an important factor in determining its usefulness.

Development of an expression for hydrating property might prove difficult. It has been found, however, that viscosity tests generally follow hydrating characteristics closely, and further research of the relationship between viscosity and that elusive property called hydration may prove viscosity data of great value.

Detailed information in regard to dirt count, strength tests, color, etc., would serve as further data of value.

If to this could be added fiber distribution data, it is believed that it might be possible to form a fairly good picture of the type of pulp which is being manufactured.

Evaluation and Classification Of Sulphite Pulps

EUGENE G. INGALLS, Pulp Mill Supt.
Wausau Paper Mills Co.

There are two broad fields in which sulphite pulp is employed. These may be classed as chemical conversion and paper. However, paper is much too broad a term for any practical purpose of testing and it is believed that this should be broken down into three classes which may be called (1) absorbent papers, (2) papers for general use, and (3) glassine and greaseproof.

First, to discuss the qualities which a pulp must have if it is destined for chemical conversion into such products as viscose, nitrates, esters, ethers and the like; as would be expected, the chemical purity of the cellulose is of the greatest importance. It is for this reason that sulphite pulps enjoy a major advantage in this field.

One of the first tests that might be applied is for cellulose content. Here it is very probable that a test for alpha-cellulose alone will not be sufficient, but that the amounts of beta- and gamma-cellulose will also have to be known. It is impossible to say what these values should be without having a rather clear knowledge of the particular chemical treatment to which it is desired to subject the pulp.

A second important chemical test is a determination of the viscosity of a solution of the pulp. This quality has generally been determined on a cuprammonium solution of pulp which has been prepared according to a specified set of conditions. A newer and apparently more successful solvent is cupriethylenediamine. There are many references to this in the recent literature. It is possible, however, that neither of these solvents will be entirely successful in yielding values which will accurately predict the behavior of a given pulp when converted to a product such as viscose. Hence it may be found necessary to actually prepare viscose from a sample of the pulp, then to determine the viscosity of this material. Clarity and filterability of solutions such as of viscose or nitrate may also be of prime importance.

For certain uses it may be necessary to test for substances other than cellulose. These would include lignin; pentosans; ash constituents such as iron, manganese, and chloride; and for resinous materials sol-

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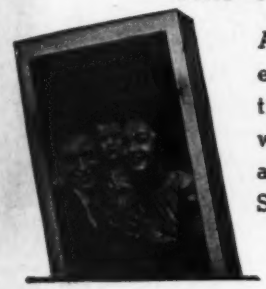

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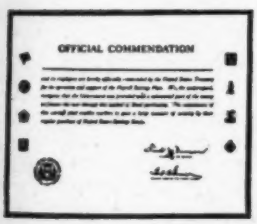

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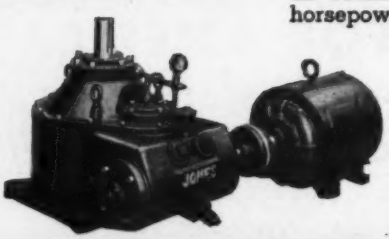

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Physical tests are relatively unimportant in connection with pulps destined for chemical conversion. A major exception, however, is the quality usually referred to as color, whiteness, or brightness. Generally it is desirable that color be good to excellent. Cleanliness or freedom from dirt specks is also generally of prime importance. Such values as ease of hydration and engineering strength data (bursting strength, tearing, and folding resistance, etc.) are normally unimportant.

It has been indicated that in determining the suitability of a given pulp for chemical conversion tests have been applied which carefully follow the manufacturing procedure of the converter. The same is done with pulps which are destined for conversion to paper and paper products. In order to do this, first it is necessary to consider some of the tests which the papermaker will apply to his product. Among these are engineering strength tests, such as bursting strength, resistance to tear, folding resistance, tensile strength and stiffness. Color, cleanliness, formation, and bulk are also important. The papermaker will, of course, apply other tests but many of these will correlate with papermaking practices and not with quality of the original pulp.

In studying the desirability of a pulp for paper conversion, there is only limited degree of interest in chemical tests which might be made on the pulp. In fact, only such tests as viscosity which will make it possible to draw inferences regarding the physical quality of the pulp are even of passing interest. Of vital interest, however, are such values as hydration properties, bursting strength, tensile strength, tearing resistance, and folding resistance. It must be remembered, however, that the above mentioned strength data are obtained from test sheets made from the pulp and do not apply to the strength characteristics of the fibers themselves. Such qualities as color, freedom from dirt, and the degree of flocculation or deflocculation which a suspension of the pulp might exhibit are also important.

It is a recognized fact that in determining the desirable qualities of a pulp for papermaking use, there is an attempt to reproduce in the laboratory something of the procedure followed by the papermaker. The pulp sample is subjected to beating in some form of equipment, then a waterleaf sheet prepared and after conditioning, that sheet is tested for various types of mechanical strength. At the same time, the drainage rates of the pulp when beaten to various degrees are determined. In order that the data obtained may be reasonably reproducible certain arbitrary procedures to follow in beating have been standardized. The sheets are likewise prepared according to a standard procedure. The sheets are unfilled and unsized. All this is both necessary and desirable in order that different pulps may be compared or results reproduced with a given pulp. However, it is obvious that from such data it is impossible to predict accurately how a given pulp will react when treated by the various types of equipment used in different paper mills. Likewise, difficulty may be encountered in predicting accurately the results which may be expected in a given mill under varying use of the existing equipment. All that can be expected at present is to call upon a great amount of experience and then hope to properly evaluate the test results.

It would seem advisable, of course, to eliminate much of the present arbitrary procedure and to determine the fundamental qualities of the pulps in question rather than to study the characteristics of test sheets made from these pulps—characteristics which are influenced by such variables as fiber bonding which is not directly measured. It does not appear that a position has been reached where this can be done. Therefore, it is necessary to continue to use the present arbitrary procedures.

Fiber length is another term which is freely used in discussion of pulp quality. However, it must be remembered that fiber length itself is of little interest. Other qualities which are normally associated with fiber length are the major interest. As an illustration, it is generally felt that a relatively short fibered pulp will make a paper sheet of inferior strength quality. This may and may not be true.

A pulp which has a suitable color and which hydrates rather slowly upon beating yet develops good strength is desired for absorbent papers. It must be remembered that these papers are made

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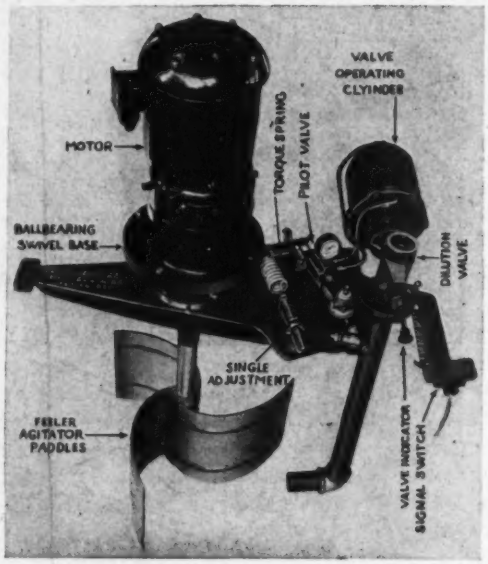

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at relatively high speed with little beating and that starches and the like are not extensively used. It is essential that sufficient strength must be developed within the sheet and yet the pulp must be very free and not hydrated in order that absorbent qualities may be maintained. Freedom from pitch precipitates is of great importance. The necessary good formation of the final sheet is directly related to the flocculating tendency of the pulp used.

When testing pulps destined for conversion into the general run of papers, such as wrapping, books, fine papers, and the like, very little weight is given to the chemical tests. As with pulps for absorbent papers tests for viscosity and the like may be made as a guide to manufacture. Ease of hydration and strength development are, of course, of primary importance. Ease of hydration is important because of the effect it has on paper drying rate and on the power consumed in stuff preparation. It is also of interest because of its relationship to strength development. No one pulp, however, can be entirely suitable to the papermaker. Price, color, freedom from dirt and pitch, ease of hydration, strength development, etc., are all considered by him. The best the pulp manufacturer can do is to supply several grades having desirable properties and allow the papermaker to blend them as he sees fit. Thus, some pulps will predominate in a given furnish while others are used as fillers where their special properties augment those of the major pulp. In general, it may be said that high color, good strength development, relatively rapid hydration, good forming properties, and cleanliness are most in demand.

The maker of glassine and greaseproof papers has an entirely different set of requirements. Nevertheless, he too, is only slightly interested in chemical purity of the pulp. In fact, the presence of certain impurities such as pentosans may be desirable. He is chiefly interested in the rate of hydration which the pulp will exhibit during treatment. These papers require a fiber which will hydrate readily and to such an extent it will form a very dense sheet of paper which is highly resistant to penetration by materials such as fatty and greasy substances. Thus the degree of hydration is of prime importance In order, however, to limit the treatment time necessary, and to hold equipment requirements at a minimum, it is essential that the necessary degree of hydration be obtained in the shortest possible time consistent with the development of essential strength qualities. These qualities are frequently tested by means of strength and blister tests performed on test sheets prepared from specially beaten pulp. The equipment used may vary considerably from that used when testing pulps for other papermaking use.

It is thus seen that sulphite manufacturers are not engaged in production of one particular type of pulp but rather are faced with the necessity of producing many types of pulp to satisfy the requirements of the user. These requirements may be chemical in nature or as in the case of papermaking, they may be physical. It would appear that the industry can be successful only to the extent to which it succeeds in accurately supplying the many types of sulphite pulps required.

An Effective Handling System for Rag Halfstock Bleaching

LAMAR A. MOSS
Technical Superintendent
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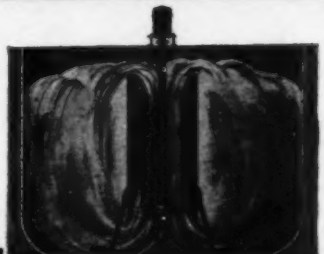

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pet liter at a phenolphthalein flash test of 5 seconds.

After settling, the liquor is drained into a concrete storage tank below which is equipped with a cast iron sump pump immersed right in the tank so that the pump is always primed by pressure on the intake and there are no packing glands on the pump to require maintenance or allow waste of bleach liquor.

The liquor is pumped through common iron piping to a 300 gallon stoneware measuring crock in the washer room. The pipe leading into the measuring crock extends almost to the bottom to reduce splashing in contact with the air, and 1/8 inch holes in this pipe are provided to break the vacuum and prevent syphoning back of the bleach liquor when the pump stops. This crock is elevated enough to give gravity flow through a common iron piping system underneath the washer room floor to each washer. The common pipe does corrode, but it lasts 1 to 1½ years and by the end of this time it is sealed up so that it would soon be plugged and require replacement even if no corrosion took place. Sections of glass piping have been tried but they too scale up and show no advantage to justify the extra cost.

A cast iron plug type valve is used at each washer to control the addition of bleach and a length of 1½ inch pipe, with four equally spaced 0.5-inch holes, extending across the washer tub just in front of the roll serves to distribute the bleach evenly through the stock.

The most interesting feature of the whole system is the automatic filling arrangement on the measuring tank. The level of liquor in this tank is shown on a scale on the side of the crock by a counterweight and pointer connected by a cable over two pulleys to a float in the crock. A mercury switch mounted on a pivoted bar is arranged alongside the scale in such a way that, as the counterweight descends as the crock fills, an extension on the pointer contacts the end of this bar tipping the mercury switch up to open the circuit. This switch is connected in the pushbutton control circuit of the sump pump motor so that when the mercury switch is opened by the descending counterweight, the pump is shut down. This bar carrying the mercury switch is mounted on a threaded rod extending the full height of the crock and the position of the switch can be adjusted up or down by means of a handwheel on the bottom end of this screw rod, which is arranged to be low enough to be operated from the floor. Obviously the position at which this switch mechanism is set determines how much bleach liquor will be pumped into this measuring tank before the mercury switch shuts down the pump. An extension rod from the mercury switch mechanism carries a pointer arranged to slide up and down on a scale conveniently located at the proper height above the floor level so that the operators can readily set the switch from the floor for the desired quantity of bleach liquor and not have to climb up to the measuring tank.

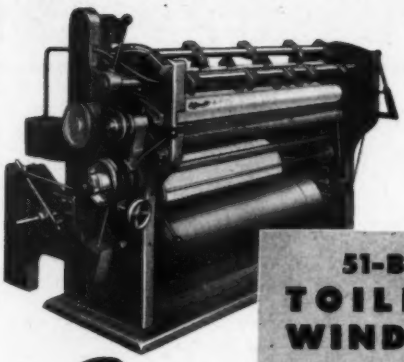
In operation, the switch mechanism is set by means of the handwheel to the proper position on the conveniently located scale so that the amount of bleach desired for one washer will be pumped up. The pump is then started manually by means of a pushbutton conveniently located in the washer room, and the proper amount of bleach is automatically pumped up so that it is ready when needed in the washer.

Furnishing the bleach to the washer is then simply a matter of opening the plug valve at the washer and draining all the measured quantity of liquor from the tank into the washer through the perforated distributing pipe.

If a different quantity of bleach is required for the next washer, the proper change in setting of the mercury switch mechanism is then made; the valve to the washer just furnished is closed; the starter button is pushed; and the required amount of bleach liquor will be ready for the next washer.

This system is simple, reasonably foolproof, easy and convenient to operate, and has given satisfactory, trouble-free operation ever since it was installed.

In spite of being immersed continuously in bleach liquor, the cast iron sump pump has stood up well in this service. It has, however, been necessary to keep a spare pump on hand as a replacement when it becomes necessary to clean out the pump or replace the steel pump shaft. Ordinarily 9 to 12 months service is obtained before such overhauling is required.



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Designed for Economy Speed Quality

A SURVEY of production records indicates that our 51-B post-war winder is "tops." Space forbids telling our entire story here, but a request from you will bring more detailed illustrations and complete descriptive information.

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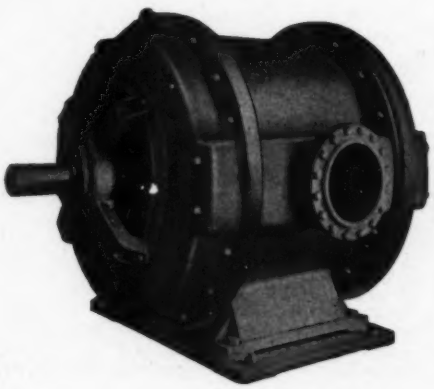
ONLY NASH VACUUM PUMPS HAVE ALL THESE FEATURES



One Moving Element. Non-pulsating Vacuum. No Internal Wearing Parts. No Internal Lubrication. Handles Liquid With Air. No Expert Attendance. Constant Efficiency. Low Maintenance Cost.

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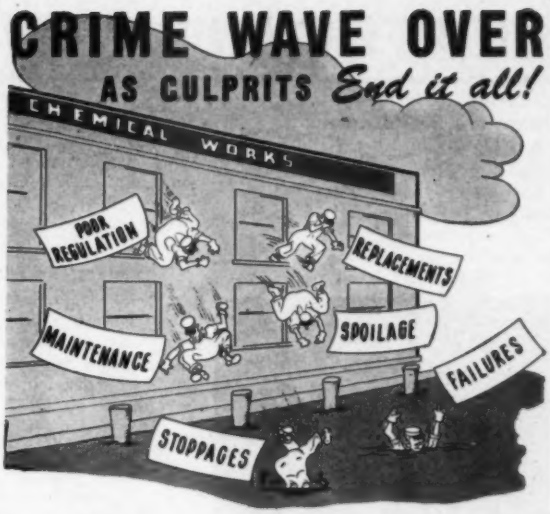

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CASH STANDARD *Streamlined* TYPE 1000 PRESSURE REDUCING VALVE

• Good reason why these culprits took a quick nose dive into the "drink." It was their only out. When the CASH STANDARD Streamlined type 1000 Pressure Reducing Valve was installed, their activities came to an abrupt end.

You too can rid your plant of such daily plagues as high costs and operating troubles due to poor valve performance.

Simply put it up to the CASH STANDARD "TYPE 1000" — find out in detail about the streamlined design — the construction — the performance that works so completely in your favor.

Maximum Capacity when needed most
Accurate Pressure Control under toughest working conditions
Trouble-free Service
Smooth Operation
Tight Closure
Accurate Regulation
Speedier Production Results
Elimination of Failures
Constant Delivery Pressure
Cost Saving Operation
No Spoilage
Practically zero in maintenance costs

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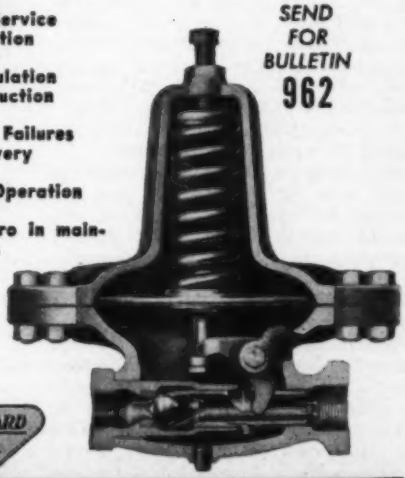


CASH STANDARD CONTROLS... VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

NEW EQUIPMENT AND SUPPLIES

Aluminum Step Ladder

A folding step ladder, constructed entirely from Aluminum Alloy 52S, has been introduced by the Aluminum Ladder Company, Worthington, Pennsylvania. Fitted with non-skid treads for safety, the ladder is recommended by the manu-

facturer for many industrial uses, such as oiling, repairing machinery, building maintenance, and other work involving portable ladders. The ladder is available in 4, 5, and 6 ft. models, the 5 ft. size weighing only 16 lb.

New Wet Strength Resin

A resin, designated as Uformite 470 and representing a new type of urea-formaldehyde modification, has been announced by The Resinous Products and Chemical Company, Philadelphia, Pa., for wet strength improvement of paper. This resin requires no special handling, aging, or pretreatment before use. After dilution with water, it is ready for immediate addition to the stock prior to sheet formation. The physical properties of the resin are: solids content, 40%; solvent, water-alcohol (2.1); pH, 7.5 to 8.0; specific gravity, 1.200 to 1.208; pounds per gallon, 10; appearance, water clear.

According to the manufacturer, this resin offers superior retention and wet strength development on sulphite, rag, and groundwood stocks; high wet strength with all stocks at low acidity; effectiveness with minimum alum or acid alone as catalyst; and excellent durability of wet and dry strength.

The manufacturer also states that the resin has been found particularly effective in producing high wet strength glassine, towelling, light-weight absorbent tissues, sulphite wrapping papers, as well as blueprint, map, chart, and ledger papers; and recommends consideration of the resin for all types of stock, including kraft, in which it is desirable to operate at a stock pH of 5.0 to 6.0, and where the optimum in permanence is required.

Other information covering the use of this resin for the development of wet strength in paper, as revealed by the announcement, follows:

It is normally advisable to reduce the solids content of the resin with water to 5 to 10 per cent prior to addition to the stock, particularly if the resin is to be added close to the machine. For this purpose, the dilution water temperature should be 60 deg. Fahr. or slightly higher.

For optimum efficiency, it is desirable to add the resin after the jordans, at such points as the headbox, screens, fan pump, etc. Although direct beater application may be employed, experience thus far has shown that such a procedure will result in a definite sacrifice in wet strength development.

If used in the production of a sized sheet, the resin solution may be added before or after the addition of resin.

Either alum or acids, such as hydrochloric and sulphuric, are used as catalysts. However, alum appears in most cases to be slightly more effective than acid alone at any given pH.

The quantity of alum or acid to be used with the resin should be sufficient to reduce the pH of the stock at the head box to 6.0 or below. It will show effective retention and high wet strength development on all stocks over a pH range of 4.0 to 6.0, whether alum, acid or combinations of acid and alum are used to attain this stock pH.

In both laboratory and commercial experience with the resin, the importance of aging samples of treated paper prior to wet strength evaluation has been apparent, particularly when this resin has been used at the higher pH levels. It is not possible to obtain complete cure, and hence maximum wet strength development, directly off the machine. However, under the proper catalytic condition, i.e., stock pH at the head box of 6.0 or below, full cure will develop on aging at room temperature for 10 to 21 days. Accelerated aging, oven conditioning for 5 minutes at 220 deg. Fahr., of paper directly off the machine may be used as the method of control of wet strength production.

New Line of Paper Cutters and Spacers

The Seybold Division of Harris-Seybold Co., Cleveland 5, Ohio, has announced a new line of paper cutters and spacers. Designated as the "Sixty" line, the models range in size from 44 in. to 84 in.

Among the new features cited in the announcement are the following:

A new knife action, a rugged knife bar, and increased clamp lead make possible straighter and cleaned cuts at an increase of 15 per cent in speed of operation. Shear angle has been increased to 53 degrees insuring greater quantity and quality of work with less clamp pressure, less effect on the machine, and longer productive life of the knife. Knife adjustment is accomplished by a new pull bar that speeds up the positioning of the knife to the cutting stick, reducing down time. A knife bar with a 36 degree bevel has been developed that is extremely effective in splitting work.

Clamp pressure control, activated by conveniently located foot pedals, enables the operator to obtain the correct amount of pressure for any type of job. Another feature of operation is a toe tip treadle booster with easy treadle action.

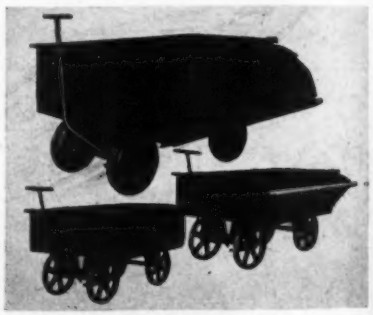
Complete illumination of the table and handwheel has been accomplished by the installation of a new hood.

A heavy duty multiple disc clutch that can be easily and quickly adjusted, a repositioning of lubrication points, and the installation of a Zerk system make for more efficient servicing and decreased maintenance.

Major safety features include a two-hand starting device, non-repeat mechanism, adequate safety guards, and safety washers.

General Utility Truck

The Market Forge Company, Garvey St., Everett 49, Mass., has announced a general utility truck with the following specifications: volume 22½ cu. ft.; inside dimensions—length 60 in., width 36 in.,



depth 18 in.; height of bottom above floor 18 in.; overall height 36 in.; wheels (pneumatic, semi-steel, or cushion rubber) 16 in. in diameter and provided with Hyatt roller bearings with forced lubrication; wheel tread 25½ in.; wheel base 37 in.

Designs may be furnished with drop side on either side of truck or on both sides. The drop side may be locked in closed, half-open, or fully opened position.

The capacity of this truck, when handling such materials as coal and the like, is approximately 1000 lb.

Soluble Sulphonephthalein Indicators

LaMotte Chemical Products Company, Towson 4, Baltimore, Maryland, has announced the development of the Clark and Lubs series of sulphonaphthalein pH indicators in soluble form. These indicators are highly purified, crystalline dyes that are instantly soluble in distilled water.

To prepare a solution ready to be used,

Specializing, too, Lindsay has made Fourdrinier wire cloth ever since 1903.

Packing and shipping at Lindsay are probably more critical operations than the customer imagines. Every employee in these departments, old and new alike, is instructed minutely in the proper handling of Fourdrinier wire cloth. This is just one of many "required subjects" in a factory-wide training course.

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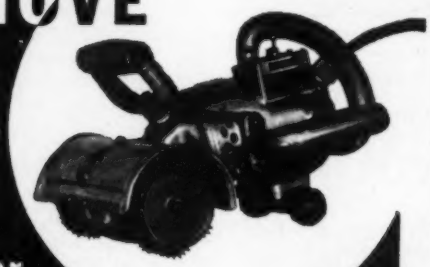
SCALE,
SLUDGE,
RUST



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accumulation . . .
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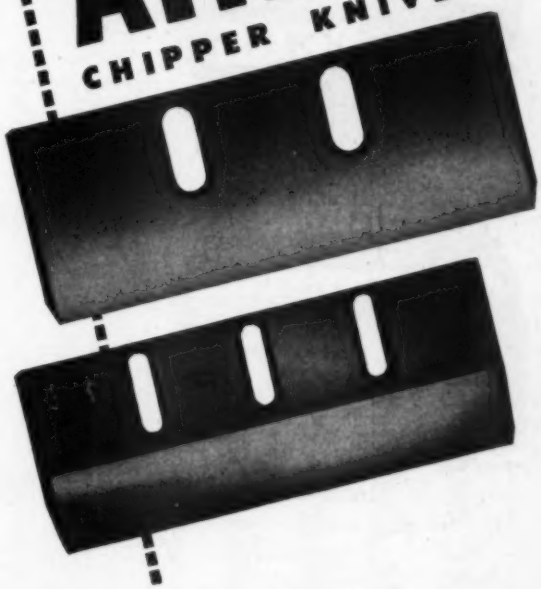
"WHAT'S COOKING"

Use

ATKINS

CHIPPER KNIVES



The choicer the chip the better the pulp . . . you know that. But how can you know that chips going into the cooking liquor are always uniform and unbruised? The surest way — that's also a cost-cutting, time-saving way — is switching to Atkins Chipper Knives.

For in Atkins Chipper Knives you get cutting quality that's second to none. You get extra-tough knives that hold their edge longer to assure more permeable chips for longer cutting runs—knives that minimize the necessity of regrinding and replacements.

You get these results, because Atkins Chipper Knives embody all the craftsmanship—all the special skills in heat treating, hardening, tempering, grinding—all the experience and knowledge that have made the Atkins Knife plant the world's largest exclusive knife factory.

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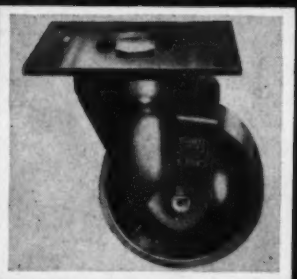

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A SAVING AT EVERY TURN

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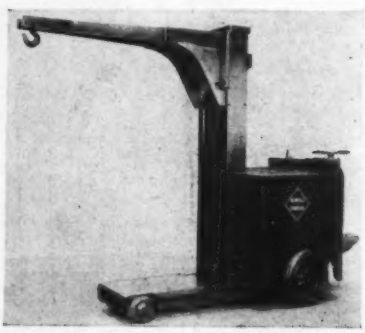
it is only necessary to weigh and place in a volumetric flask containing distilled water, the required amount of dye. The dyes go into solution without heating or the addition of alkali.

The following list shows the indicator dyes that are available, with their respective *p*H ranges:

	*p*H Range
Acid Cresol Red	0.2-1.8
Meta Cresol Purple (acid)	1.2-2.8
Thymol Blue (acid)	1.2-2.8
Bromphenol Blue	3.0-4.6
Bromcresol Green	3.8-5.4
Bromcresol Purple	5.2-6.8
Chlorphenol Red	5.2-6.8
Bromthymol Blue	6.0-7.6
Phenol Red	6.8-8.4
Cresol Red	7.2-8.8
Meta Cresol Purple (alkaline)	7.4-9.0
Thymol Blue (alkaline)	8.0-9.6

Power Truck with Horizontal, Non-Swivel Type Boom

The Elwell-Parker Electric Co., Cleveland, Ohio, has announced a power truck equipped with a horizontal non-swivel



type boom. The truck as developed can carry loads up to 3,000 lb. The boom is available in lengths 72, 66, and 60 in. from face of uprights. The boom may be made interchangeable with a platform where desired.

Electric Hygrometer

American Instrument Co., Silver Spring, Maryland, has announced the *Aminco-Dunmore* electric hygrometer for high-precision humidity measurement and con-

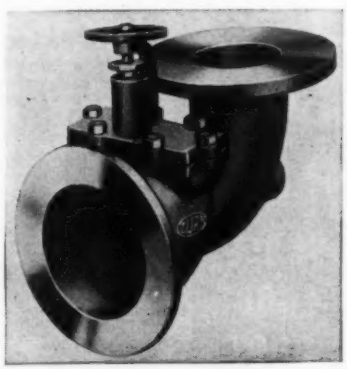
trol. The instrument employs a sensing element that is claimed to be the speediest device known for measuring humidity changes. It gives reproducible readings throughout the entire standard dry-bulb temperature range of 40 to 120 deg. Fahr., and relative humidity range of seven to 100 per cent.. Micro-changes within plus-minus 0.5 per cent relative humidity are instantly sensed, indicated, or recorded within the standard temperature change.

Rubber Base Paint

Truscon Laboratories, Inc., Caniff and Grand Trunk R. R., Detroit 12, Mich., has announced *Paratex* as a paint for use on concrete floors as well as any exposed surface of concrete, wood or steel where protection against sun, rain and weathering is desirable. The paint is a rubber resin formulation.

Discharge Check Valve

J. A. Zurn Manufacturing Company, Erie, Pa., has announced a discharge check valve designed to give protection against the back surge of discharge lines, carrying steam, sludge, waste water and other waste liquids in gravity flow installations. A swing check flap suspended from a full floating pin fulcrum insures full surface contact between ground face of flap and flap seat. A knob in the center of the top surface of the swing check flap contacts the valve body roof at only one point when the swing check flap is wide open. This feature prevents the swing check flap from touching the sides of the valve body and assures free operation of



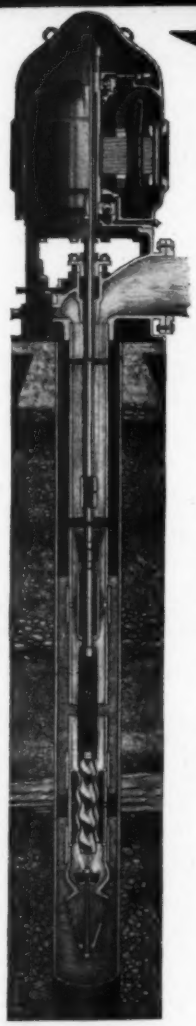
the swing check flap. Location of swing check flap in relation to interior of valve body provides protection against sediment blocking of the valve. Swing check flap suspended from cover can be removed easily and replaced.

The check valve may be operated with or without a manual control or with an extension shaft or flexible cable from an access box. It is available with 180 deg., 105 deg. or 90 deg. bodies made of cast bronze, steel, semisteel, cast-iron, and alloyed metals. Flanges are flat-faced and blank or drilled as specified.

Boiler Feed Water Test Kit

The Permutit Company, 330 West 42nd St., New York 18, N. Y, has announced a kit for the testing of boiler feed water for hardness, alkalinity and chloride content. The test kit, containing solutions and pipette droppers for accurate measurements, comes in a portable white enamel cabinet, 10 in. by 10 in. by 4¾ in. When desired, the kit can be modified to permit the testing of sodium sulphite in boiler water.

HERE'S HOW
"Squeezing Water Upward"
SQUEEZES
UPKEEP
DOWN



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HI-LIFT PUMPS
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For low-cost, limited water supply demands of multiple industrial uses.

CAPACITIES: 600 to 3300 Gals. per Hour FOR WELLS AS SMALL AS 4" INSIDE DIAMETER.

Peerless HI-LIFT is the pump that gives magic wings to water lift, with an ingenious pumping element.

Employing simplicity to the best possible advantage, Peerless has replaced high shaft speed, vibration, and high operating cost, found in most conventional type pumps, with a slow, smooth continuous positive pumping action that literally "squeezes" the water upward.

The only moving part in the pumping element consists of a hard, heat-treated, chrome-plated stainless steel rotor, helically contoured and revolving within a similarly shaped cutless rubber stator. Both of these units are highly resistant to abrasive action.

Buy the pump that "squeezes" water upward and squeezes upkeep down. Investigate today the many possibilities offered you with a Peerless Hi-Lift Pump.

SELF-PRIMING
NO OIL USED UNDERGROUND

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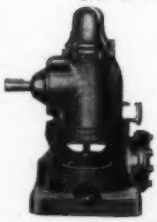
PATENTS: Manufactured under R. Moineau patents, U.S. 1892217, 2028407 and Re-issue 21374. Canadian Patent 352574. By Exclusive License to Robbins and Myers, Inc. Peerless U.S. Patents 2208937, 2338937 & 2346426. Other Patents pending.

PEERLESS TURBINE PUMPS

Gearturbo (Right Angle Gear Drive) Illustrated



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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Lignin Oxidation

Using butanol lignin at a lead cathode and a sodium hydroxide electrolyte, the following oxidation products were identified: methyl ethyl ketone, acetone, acetic acid, resorcylic acid, protocatechuic acid, p-hydroxybenzoic acid, m-toluic acid, oxalic acid, and isobutyl methyl ketone. The general object of the investigation was to investigate the behavior of lignin in electrolytic oxidation and reduction. Other lignins, which gave lower yields of products (which were not identified) were sulphite waste liquor from western hemlock, a mixed alkali lignin, and a methylated butanol lignin. A. Bailey and H. M. Brooks. (Univ. of Washington) J. Am. Chem. Soc. 68, 445-6 (1946).

Damaged Chips and Pulp Quality

Experimental cooks in stainless steel baskets suspended in a commercial steel digester showed that there was a definite loss in pulp strength owing to the bruising action of the chipper knives. The damage to the wood is fairly constant regardless of chip length. Cooks made with hand-made chips varying from ¼ to 2 inches in length, showed that it was possible to produce sulphite pulps having Mullen values equal to those of sulphate pulps (or better). Chips of ¾ inch size gave the best strength values. C. A. Anderson. Pulp Paper Mag. Canada, 47, No. 1, 43 (1946).

Pulping Fibrous Raw Materials of France and Africa

Pulping experiments were carried out with the following materials:—various French cereal straws, the stems of Jerusalem artichokes, the dwarf palm ("Doum") of Northern Africa, the aquatic plant "Zizania", French grapevines, the woods of the umbrella tree of Equatorial Africa and of the "silk-cotton tree" of East Africa, and to a more limited extent (for comparative purposes) the wood of maritime pine. Tabulated data giving details are given for soda cooks, with and without pressure, and also when the wood or other materials were pretreated with aqueous nitric acid. A few sulphite cooks are also described.

The results indicate that whereas the straw pulps can be pulped by alkaline treatments it is advisable to use such pulps in combination with longer fibered material. Jerusalem artichoke stems furnish a fairly satisfactory primary raw material, both for pulping and use in admixture with other pulps, or as a means of obtaining extractives which furnish sugars. For example, a prehydrolysis with 5% hydrochloric acid removed about 28% of material from the stems, and of this, 24% was in the form of reducing sugars. In the case of the Jerusalem artichoke stems, prehydrolysis with nitric acid followed by 3½ hours of cooking with alkali at 100 C. gave 54.6% of dry pulp. However, the caustic soda consumption and the bleach requirements were both much higher than in the case of the straws. Furthermore, the tensile strength of Jerusalem artichoke pulp was relatively low.

Conclusions reached with regard to French colonial woods (and other fibrous materials) may be summarized briefly as follows: the dwarf palm gives a weak pulp unsuited to papermaking. "Zizania," however, may be readily delignified with caustic soda at atmospheric pressure, and the pulp quality is satisfactory, although the yields are only of the order of 40%. Grapevines must be considered unsatisfactory. Yields are low and the pulp quality is poor. By the usual type of soda cook, the woods of the umbrella tree and of the silk-cotton tree both give high yields of pulp with a relatively low alkali consumption. However the pretreatment with nitric acid is not desirable in these cases. The umbrella tree wood may also be pulped satisfactorily by means of calcium bisulphite, with a yield of about 50% and good pulp quality. Maritime pine, which does not lend itself to pulping by the ordinary sulphite pulping operation, could be pulped with sodium bisulphite by heating, at 135 deg. for 14½ hours. The pulp quality was fairly satisfactory, but the yield was only about 41%, and the quality is below that of the umbrella tree wood pulp. G. Dupont and R. Escourou. Chimie et Industrie 47,307-315 and 470-474 (1942). (Note: these journals despite their date of publication have just been received in the U. S. A.).

Causticization of Green Liquors Produced in Alkaline Processes

NaOH solutions were prepared from the green liquor produced in alkaline pulp manufacturing processes by a substantially continuous electrolysis, whereby a continuous discharge of the NaOH solution is obtained. Only a partial conversion of the carbonate in the liquor is effected so as to avoid an undue rise in the cell resistance. In the sulphate process, the green liquor is electrolyzed and the hydrogen sulphide produced at the anode is absorbed in the NaOH discharged at the cathode.

In one example, green liquor containing sodium carbonate was fed to a cell having a carbon anode, a mild steel cathode, and an asbestos paper diaphragm, and an effluent liquor containing 186 grams per liter of sodium carbonate and 140.5 grams per liter of sodium hydroxide was continuously withdrawn. The voltage was 3.5 and the temperature 41 deg. The effluent was partially evaporated and cooled to deposit soda crystals, and the liquor containing 266 grams NaOH and 68 grams sodium carbonate per liter was used for cooking fresh charges of wood. Other examples give the use of a mercury cell. Henry B. Somerset (to Associated Pulp and Paper Mills, Ltd.) Australian Patent 118,661 (July 1944).

Testing the Repellency of Papers Towards Insects

A method is proposed for testing fabrics and papers for their repellency or attractiveness to "silverfish" and roaches. Details are given of the habits of these insects and their maintenance for testing purposes, and of specific tests under physical conditions that are easy to establish and to maintain. Damage may be gauged visually, the percentage surface injury being determined by means of a glass plate with a ruled cross-sectioned area that covers the test sample.

The tests have shown that, whereas the insects seldom injure wool, hair or cotton, they are very injurious to synthetic fibers and that many types of paper are also attacked. Even papers lacking edible finishes are attacked (e. g. toweling) although more attractive to the insects are papers containing starch and protein materials. The article contains 19 references. H. Sweetman, C. L. Warner and B. J. Hershberg. Soap San. Chemicals 21. No. 3, 104-7, 127, 129, 131 (1945) through B. I. P. 16, 137-8 (1945).

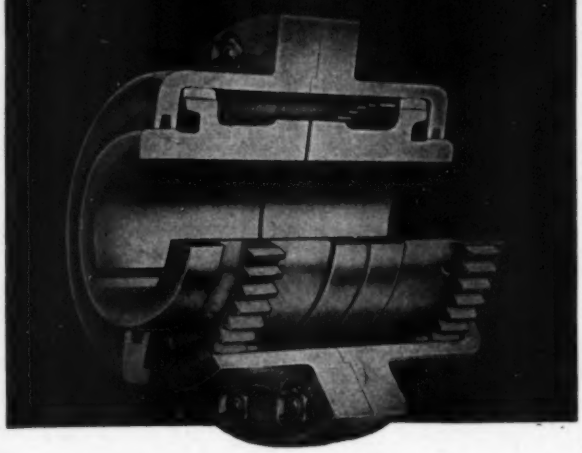
Chemistry of Ponderosa Pine

The author has made a study of the distribution and nature of the acetone soluble extractives of this pine. These extractives include resin acids, terpenes, free fatty acids, fats, and unsaponifiables. Three mature trees in Oregon were taken, and disks cut from them at various heights. Sampling and preparation are described in detail, as are the methods of analysis used. Evidently the l a r g e s t amount of acetone extractives was found in butt heartwood and the least in the outer sapwood. The effect of age and position of the wood in the tree on the amounts of extractives is given in some detail. Furthermore the author gives the composition of the acetone extracts of both heart and sapwood. Arthur B. Anderson (Western Pine Association Research Lab.) Ind. Eng. Chem. 38, 450-4 (1946).

Use of Oxygen in Sulphite Pulp Production

In burning pyrites or sulphur, the use of oxygen would permit the production of 100% sulphur dioxide, but the temperature must be kept sufficiently low to prevent oxidation to sulphur trioxide. A Freeman burner or similar equipment would be required. The author claims that the availability of concentrated sulphurous acid would greatly cheapen and increase sulphite pulp production. M. G. Eliashberg. *Kislorod* 1944, No. 4, 38-50; through C. A 40, 3896, 1946.

POOLE



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PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Head Box Slice for Papermaking Machines

Patent No. 2,394,509. Leo J. Boettinger, Sartell, Minn. Application May 3, 1943. Serial No. 485,509. 4 Claims. (Cl. 92—44).

1. In a head box construction for paper making machines the combination of a head box, a slice in the lower longitudinal corner of the head box comprising a plurality of superposed series of ducts in fan-shaped relation transversely of the head box, the adjacent series of said ducts having the passageways thereof disposed in non-parallel relation so that the flow of the paper stock from the outlet ends thereof will deposit the paper stock in layers upon the table wire with the fibres in intersecting angular relation.

Paper Machine Sectional Drive

Patent No. 2,392,149. Lloyd Hornbostel, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application March 25, 1943, Serial No. 480,434. 12 Claims. (Cl. 74—286).

1. A mechanical drive comprising a hollow drive shaft adapted to receive a line shaft therethrough, a clutch adapted to selectivity connect the drive shaft with a line shaft received therethrough, a differential unit having one side thereof driven by said hollow shaft, a speed changer driven by said hollow shaft, a speed changer driving the other side of said differential unit, means driving said speed changer from said hollow shaft, a differential shaft driven by said differential unit, a transverse shaft driven by said differential unit shaft, a gear casing swingable about said transverse shaft, a power delivery shaft rotatably mounted in said gear gasing, gears in said casing connecting said transverse shaft with said power delivery shaft, said power delivery shaft adapted to be positioned at a desired level by swinging said gear casing about said transverse shaft, and said speed changer unit adapted to be adjusted for controlling the speed of said power delivery shaft relative to the speed of said hollow drive shaft.

Paper Stock Disintegrator

Patent No. 2,394,182, John Inglis, Rutherglen, Scotland, assignor of one-half to Clyde Paper Company Limited, Rutherglen, Scotland. Application November 18, 1942, Serial No. 466,006. In Great Britain November 20, 1941. 14 Claims. (Cl. 92—26.)

6. A paper stock disintegrating machine comprising a casing, inner members of generally conical shape in said casing, said casing having closely spaced walls that provide an annular disintegration chamber and also having walls of generally conical shape constituting outer members that cooperate with said inner members to form divergent annular passages opening at their larger ends into said chamber, conduits at opposite ends of said casing for leading supplies of paper stock in opposite directions to said passages and chamber, said conduits opening into the smaller ends of said annular passages, sets of vanes mounted at an inclination on selected ones of said inner and outer members there being one set of said vanes to each selected member and the vanes of the different sets being inclined to the same hand and located in said annular passages, said vanes by virtue of their mountings on the selected members being constrained in relation to the paper stock for co-operation with said annular passages to transform said supplies into relatively oppositely rotating hollow circular sheets of paper stock and being extended to said chamber to force said sheets rotationally oppositely into one another therein, and an outlet in said casing for discharging said supplies in an intermingled and disintegrated state from said chamber.

Press Roll for Papermaking

Patent No. 2,395,915. Harry G. Specht, Montclair, N. J. Application July 13, 1942. Serial No. 450,687. 8 Claims. (Cl. 92—49).

1. In a press roll structure for use in paper making, a rotatable roll member having a longitudinal space extending therethrough, a longitudinal deflection beam member non-rotatably supportable contiguous to its ends and having its deflection span engaged within said space for relative deflection movement therein, and whereby a deflection gap is produced between said roll member and the deflection span of said beam member, and a series of yieldable pressure-applying means arranged in longitudinally spaced relation between the ends of said roll member and interposed in the deflection gap between said beam member and said roll member.

Paper Machine Head Box

Patent No. 2,393,244. Original application September 27, 1938, Serial No. 231,854. Divided and this application May 9, 1941, Serial No. 392,716. 1 claim. (Cl. 92—46).

In a paper machine of the type wherein a sheet is formed by bringing a paper stock comprising a pulp suspension into contact with a forming surface, a headbox comprising; a vertically arranged outer conduit having a cross-sectional area that increases gradually and continuously from the bottom of said outer conduit to the top of said outer conduit; an inner conduit to the top of said outer conduit; an inner conduit vertically arranged within said outer conduit and having a cross-sectional area that increases gradually from the bottom of said inner conduit to the top of said inner conduit; said inner and outer conduits being coaxially arranged; the upper edge of said inner conduit serving as an overflow means between said conduits; means for supplying stock to the inner of said conduits at a point near the bottom of said inner conduit; and means for withdrawing stock from the outer of said conduits at a point near the bottom of said outer conduit, whereby stock flows upwardly through the inner conduit at a gradually decreasing velocity, over said overflow means into the outer conduit and all of the stock passing over said overflow means flows downwardly through said outer conduit at a gradually increasing velocity.

Process of Disposal of Sulphite Waste Liquor

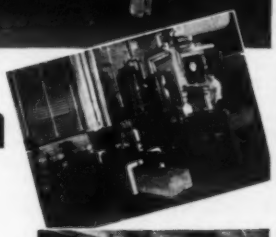
Patent No. 2,392,435. Richard Gaines Tyler, Seattle, Wash. No drawing. Application January 25, 1943, Serial No. 473,518. 17 Claims. (Cl. 23—48).

In the process of disposing of sulphite waste liquor derived from manufacturing pulp by a calcium bisulphite digestion of wood, the sequence of steps which comprises passing sulphite waste liquor in the concentration as received from the digester through an acid resistant base exchanger which has been previously regenerated by means of a solution containing sodium chloride whereby the effluent liquor is substantially free of calcium compounds, reducing the water content of the effluent liquor, and burning the residue to a smelt containing commercially valuable sodium salts.

Mineral-Coated Printing Paper

Patent No. 2,395,992. John W. Clark, Westbrook, Maine, assignor to S. D. Warren Company, Boston, Mass., a corporation of Massachusetts. No drawing. Application April 1, 1944. Serial No. 529,179. 2 Claims. (Cl. 117—65).

1. Process of producing a mineral-coated printing paper of high gloss and high brightness and having excellent ink-receptivity, which comprises coating at least one side of a web of paper body stock with an aqueous slurry of mineral-coating composition consisting essentially of a water-dispersible adhesive component and a pigment component substantially consisting of causticized calcium carbonate pigment having an average particle size of not to exceed 1 micron diameter and a casein requirement less than 25, under conditions yielding a continuous layer of coating of a thickness equivalent to at least 10 but not more than 25 pounds per ream, substantially drying the so-coated web, and thereafter subjecting the coated web to a supercalendering treatment, using a supercalender composed of alternating metal rolls and yielding rolls whose yielding rolls have a hardness intermediate a metal roll and a cotton roll, of a severity equivalent to the imposition on the paper of a pressure of about 2000 pounds per linear inch at the top nip of the supercalender.



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Center—Another section of Testing Laboratories.
Lower—Chemical Laboratory

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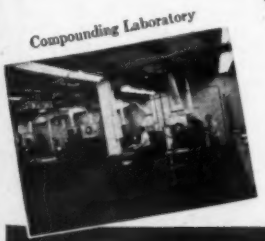

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New Catalogues and Publications

Alexander Bros., Philadelphia, Pa.—The new Hydraulic and Pneumatic Leather Packing Guide released by this company contains packing data covering usage, types, sizes, tables, etc., for industries in which hydraulic and pneumatic machinery is used.

Allis, Louis, Co., Milwaukee 7, Wis.—In bulletin No. 720 the Type OG (protected type) Standard Squirrel Cage Induction Motor is described. The publication covers fully the construction features and typical applications of the motor which has been tested in wartime use.

American-La France-Foamite Corp., Elmira, N. Y.—The new "All-Weather" line of water repellent, mildew resistant fire hose manufactured by Goodyear for this company is described in a recently issued brochure. The hose is constructed to endure rough usage and to withstand extreme temperatures.

Bailey Meter Co., Cleveland 10, Ohio—Instruments and controls for Process Industries is the title of Bulletin No. 17 which has just been issued by this company. Process controllers, control components, measuring components, and instrument combinations are described and illustrated. Application data covering sizes, pressure standards, and ranges are also listed for various components.

Bowser, Inc., Refrigeration Div., Terryville, Conn.—A new series of illustrated data folders covering the Bowser laboratory and production testing equipment which simulate conditions of altitude, including sub-zero temperatures, relative humidity, and vacuum conditions has been released.

Bristol Co., Waterbury 91, Conn.—In Bulletin No. S1400 the line of Tachometer Recorders and Indicators manufactured by Bristol is described. This includes a complete survey of the Pyromaster potentiometer-type tachometer, together with a description of the millivoltmeter-type indicating, and strip-chart recording tachometers. The bulletin gives wiring diagrams and application data.

Bulkley, Dunton Organization, 295 Madison Ave., N. Y.—An illustrated brochure on Sveen Pedersen Flotation Save-All has just been published by this company describing the salient features of the flotation type save-all. This type of save-all is claimed to clarify white water thoroughly enough to permit its reuse in paper or board mill systems. In addition to saving fiber, fuel, water, and chemicals, it is recommended for the solution of stream improvement problems.

Duriron Co., Inc., Dayton 1, Ohio—In a pamphlet released recently, complete engineering data relating to the Duriron and Durichlor Pipe and Fittings are given. The bulletin gives the uses of high silicon cast iron pipe in its resistance to corrosive solutions, together with hints for the avoidance of misapplication, and installation data. Advantages, limitations, dimensions, and available fittings are catalogued.

Goodrich Co., B. F., Akron, Ohio—Two catalogue sections dealing with the products produced by Goodrich for protection against industrial fires are now available upon request. The section pertaining to fire hose describes the methods of construction and manufacture, and lists brands, sizes, and purposes of the Goodrich hoses. The second section, pertaining to extinguishers, gives pertinent data on the 15-pound extinguisher of Goodrich manufacture. . . . Another new booklet released by this firm describes its line of Vibro-Insulators, devices of rubber and metal used to cushion industrial equipment and to reduce vibration and noise. Use of these devices provides quieter machine operation and greater stability of operation.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.—Information on the properties and precautions in handling fluorine has been made available to the users of this rare and reactive element in a manual designated as Pennsalt Manual F-1. Timely information on research, shipment, precautions, and first aid are given in the booklet.

Norton Co., Worcester 6, Mass.—This company has prepared A Handbook on Abrasives and Grinding Wheels which is available to industries using its products. The booklet includes technical data with reference tables, grinding examples, operating rules, handling, storage, and inspection of equipment, definitions, and recommendations and selection tables.

Robins Conveyors, Inc., Passaic, N. J.—Bulletin No. 111-A, now available, describes and illustrates the Robins Eliptex Screen. The mechanical features of the screen are given detailed treatment, and applications for their use in dewatering, heavy-media dewatering, and asphalt plants are defined in detail.

Towmotor Corp., Cleveland 10, Ohio—Lift Truck Job Studies are offered as an aid to manufacturers having materials handling problems. These studies report in detail the methods used by many industries to speed up their handling of material.

Waldron, John, Co., New Brunswick, N. J.—The Series "A" Coupling Catalog No. 57 published by this company is now available. The booklet is illustrated and describes various types of coupling devices manufactured by Waldron, giving specifications and rating tables.

Books

Advances In Colloid Science (Volume II)—Initiated by the late Elmer O. Kraemer and edited by H. Mark, Polymer Research Institute, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., and G. S. Whitby, Rubber Research Laboratory, University of Akron, Akron, Ohio, this volume covers the scientific progress in the field of rubber and synthetic elastomers.

The contents of the volume and their respective contributors follow: Second-Order Transition Effects in Rubber and other High Polymers, by R. F. Boyer and R. S. Spencer, both of the Physical Research Laboratory, The Dow Chemical Company, Midland, Michigan; Crystallization Phenomena in Natural and Synthetic Rubbers, by Lawrence A. Wood, National Bureau of Standards, Washington, D. C.; The Study of Rubber-like Substances by X-Ray Diffraction Methods, by C. W. Bunn, Research Department, Imperial Chemical Industries, Ltd., Alkali Division, Northwich, England; The Thermodynamic Study of Rubber Solutions and Gels, by Geoffrey Gee, British Rubber Producers' Research Association, Welwyn Garden City, Hertfordshire, England; Significance of Viscosity Measurements on Dilute Solutions of High Polymers, by R. H. Ewart, General Laboratories, United States Rubber Company, Passaic, N. J.; The Kinetic Theory of Rubber Elasticity, by E. Guth, Department of Physics, University of Notre Dame, Notre Dame, Ind.; H. M. James, Department of Physics, Purdue University, Lafayette, Ind., and H. Mark, Polymer Research Institute, Polytechnic Institute of Brooklyn, N. Y.; Vulcanization, by E. Harold Farmer, British Rubber Producers' Research Association, Welwyn Garden City, Hertfordshire, England; Rubber Photogels and Photo-vulcanizates, by Henry P. Stevens, Redisham, Beccles, Suffolk, England; and Reinforcing and Other Properties of Compounding Ingredients, by Donald Parkinson, Dunlop Rubber Company, Ltd., Birmingham, England.

The book totals more than 450 pages. Its price is $7.00 a copy. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y., is its publisher.

Directory of Producers, Importers and Agents Offering Market Wood Pulp (First Edition)—Published by the Association of Pulp Consumers, Inc., Mills Building, Washington 6, D. C., this directory, divided into three sections and two indexes, covers not only the United States but also Canada, Newfoundland and European countries.

Section I lists producers of market wood pulp by countries, together with the kinds of market wood pulp produced and the locations of the producing mills.

Section II contains a listing of importers and agents handling market wood pulp and the names of the mills they represent.

Section III lists the producers, importers, agents, countries of producers and brand names under each major kind of market wood pulp. The indexes cover producers, importers, agents and also the brand names under which the various wood pulps are sold.

The Association, distributing the directory to its members, has priced the publication to non-members at $7.50 a copy.

The Electron Microscope (Revised and Enlarged Edition)—In the preparation of this edition, the authors, E. F. Burton, Head of the Department of Physics and Director of the McLennan Laboratory, University of Toronto, and W. H. Kohl, formerly Chief Engineer, Rogers Electronic Tubes Limited, rearranged and revised the text of the first edition in many places to attain greater coherence of the subject matter. Some of the material was completely rewritten and also much new material was added. The subjects treated in this edition are: Vision, Light Microscopes, What Is Light? Wave Motion and Wave Motion Media, Wave Motion in Elastic Media, Light Waves and the Microscope, The Electromagnetic Theory of Light, The Electron, Electron Emission, The Dual Theory of Light, The Dual Theory of the Electron, The Motion of Electrons in Electrical Fields, The Motion of Electrons in Magnetic Fields, Electron Optics—I. Magnetic Focussing, Electron Optics II. Electrostatic Focussing, The Electrostatic Electron Microscope, The Magnetic Electron Microscope, The 1944 Toronto Microscope, Useful Magnification, The Use of the Electron Microscope, and Practical Applications of the Electron Microscope. Also included is a bibliography of electron microscopy, prepared and published recently by Claire Marton of Stanford University and Samuel Sass of the University of Michigan, and presented here with the permission of the authors and the publishers of the Journal of Applied Physics. The text is nicely illustrated with photographs and draws. The drawings are by Dorothy Stone. The book is priced at $4.00 a copy. Its publisher is Reinhold Publishing Corporation, 330 West 42nd St., New York, N. Y.

What Price Supervision—A 46-page, 6½x9½ inch, fabrikoid cover, spiral-bound publication, this book is authored by R. D. Bundy, Supervisor, Vocational Training, Board of Education, City of Cleveland (Ohio). The text is divided into five chapters: namely, Pattern of Management — Foremen Relations, What Is Supervision? A Pattern of Supervision, Values and Supervisory Worth, and What Price Supervision?

The price of the book is $2.00 a copy; the publisher, National Foremen's Institute, Inc., Deep River, Conn.

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	per cwt.
Blue Overalls	–3.50
Corduroy, Men's	–3.50
Corduroy, Ladies'	–3.00
Washables, No. 1	–3.00
Percales	–4.75
New Soft Blacks	–3.75
Light Prints, No. 1	–4.50
Khaki Cuttings—	
Bleachable	–4.25
Unbleachable	–3.50
New White Canvas	–6.50
New Mixed Blacks	–2.25
Canton Flannels, Bleached	–7.00
Shirt Cuttings—	
New White No. 1	–7.25
No. 1 White Headings	–7.25
White Shrunk	–5.00
Silesias No. 1	–5.75
New Unbleached	–7.50
Fancy	–3.50
Linen Cuttings—	
American	–5.00
White	–14.00
Grey	–14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowance of $1 to $2 a ton depending on the value of the grade involved.

Roofing	per ton
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
White, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

per cwt.

New Dark Cuttings, New Mixed Cuttings, New Light Silesias, Light Flannelettes, Unbleached Cuttings, New White Cuttings, New Light Oxfords, New Light Prints — Nominal

RAGS (Foreign)

ex dock New York City

OLD RAGS

per cwt.

No. 1 White Linens, No. 2 White Linens, No. 3 White Linens, No. 4 White Linens, No. 1 White Cottons, No. 2 White Cottons, No. 3 White Cottons, No. 4 White Cottons, Extra Light Prints, Ord. Light Prints, Med. Light Prints, Dutch Blue Cottons, French Blue Cottons, French Blue Linens, Checks and Blues, Linsey Garments, Dark Cottons, Old Shapperies — Nominal

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f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	$4.50 to 4.75
Wool Tares—	per cwt.
Light	4.50 to 4.75
Heavy	4.75 to 5.00
No. 1 Scrap Bagging	3.75 to 4.00
Manila Rope—	
No. 1 large	–*115.00
No. 1 small	–*105.00
Sisal Rope—	
No. 1 large	–*95.00
No. 1 small	–*80.00
New Burlap Cuttings	5.50 to 5.75
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	–*80.00
No. 2 sisal	–*60.00
Soft jute	5.00 to 5.50
Mixed	2.00 to 2.25

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Shavings—	per ton
White Env. Cuts, One-Cut	67.50–
Hard White En. Cuts	62.50–
Hard White, No. 1	57.50–
Soft White, No. 1	50.00–
Soft White, One-Cut	57.50–
Soft White, Misc.	43.00–
Fly Leaf, No. 1	33.50–
Fly Leaf, Woody, No. 1	25.00–
No. 2 Mixed Col. Woody	18.00–
Flat Stock—	
No. 1 Heavy Books and Magazines	38.50–
Mixed Books	22.00–
Ledger Stock—	
No. 1 White	46.00–
No. 1 Mixed (Colored)	40.00–
Manilas—	
New Env. Cuttings	53.00–
New Env. Cuts, One-Cut	57.50–
Extra Manilas	39.00–
Manila Tab Cards, Free of Ground Wood	45.00–
Ground Wood Manila Tab Cards	27.00–
Kraft—	
Envelope Cuttings	65.00–
Mixed Env. or Bag Cuts	55.00–
Tripled Sorted No. 1 Brown	50.00–
New 100% Cor. Cuts	45.00–
No. 1 Old Assorted	35.00–
News—	
White Blank	32.00–
Overissue	22.00–
No. 1 Baled	20.00–
Old Corrugated Containers	28.00–
New Corrugated Cuts	18.00–
Mill Wrappers	22.00–
Box Board Chips	14.50–
No. 1 Mixed Paper	19.00–

CHEMICALS

f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25–
Ground, cwt.	4.00–
Powdered, cwt.	4.40–
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to —
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	33.00 to 33.75
80-100 mesh (bags), lb.	—
Argentine, lb.	33.00 to 33.75
China Clay—	
Domestic Filler Bulk (mine) ton	8.00 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	22.00 to 25.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	21.00 to 21.25
Litharge, powd., bbl., lb.	.09¾ to 10¾
Rosin (Gum)—	
New York, per 100 lbs.	
E	7.33—
F	7.43—
G	7.48—
WW	8.12—
Rosin (Wood), carlots	4.50—
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to —
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30–
Ground and flake, drums, cwt.	2.70 to 2.95
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	5.87—
Pearl, barrels, cwt.	5.98—
Paper (Sp.) bags, cwt.	5.98—
Powdered, barrels, cwt.	6.02—
Sulphur (Crude) (Mine) bulk, long ton	16.00 to —
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 25.00
Canadian	24.00 to 30.00
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06¾
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	8.25 to 8.50

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo. (West of the Continental Divide and in Denver, Colo., ceilings are $6 per ton lower):

Bleached softwood sulphite	103.50
Unbleached softwood sulphite	90.00
Bleached hardwood sulphite	100.50
Unbleached hardwood sulphite	87.50
Northern bleached sulphate	103.50
Southern bleached sulphate	97.00
Northern semi-bleached sulphate	98.00
Southern semi-bleached sulphate	91.50
Northern unbleached sulphate	83.50
Southern unbleached sulphate	76.50
Bleached soda	93.50
Unbleached soda	88.00
Ground wood pulp	64.00
Ground wood—paper machine dried and mutilated	67.00
Sulphite screenings	50.00
Sulphate screenings	44.00
Ground wood screenings	37.50
Northern unbleached sulphate siderums	83.50
Southern unbleached sulphate siderums	76.50
Standard news print siderums	64.00

PAPER

f. o. b. New York City

Boards—	per ton
Binders	90.00—
Chip	58.00—
Chip, tube and can	58.00—
Chip, full-blending	60.00—
Chip, sgl. mla. lined	65.00—
Coated, white patent .018	84.00—
.020 and heavier	79.00—
Kraft liner	74.00—
Filled News	58.00—
Container	58.00 to 60.50

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	9.35
B Grade E. F.	8.85
C Grade E. F.	8.55
D Grade E. F.	8.25
No. 2 Uncoated Offset 4 sides, White	8.45

Coated White (Trimmed 4 sides)

No. 1 Glossy	12.65
No. 2 Glossy	12.40
No. 3 Glossy	11.60
No. 4 Glossy	11.15
C2S Offset	10.40
C1S Litho (Varnish)	10.05
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond —	per cwt 20 lb.	16 lb.
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.25
25% Rag	14.00	15.00

Rag Content Ledger—	per cwt. Zone 1
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	12.75	13.70
No. 1 (M.F.) watermarked	9.00	9.70
No. 2 (M.F.) watermarked	8.25	8.85
Plain (M.F.) unwatermarked	7.00	8.20

Sulphite Ledger—	per cwt. Zone 1
No. 1 (M.F.) watermarked	10.00
No. 2 (M.F.) watermarked	9.25
Plain (M.F.) unwatermarked	8.60

Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleached (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleached (25 lb. up)	11.00 to 11.50
Unbleached (25 lb. up)	10.00 to 10.50

News—OPA Ceilings—	per ton
Rolls, Standard (Contract)	74.00
Rolls (Spot)	(Nominal)
Sheets	

Tissues (Carlots)—	per ream
White, No. 1	1.12½ to 1.20
White, No. 2	.90 to 1.00
Bleached Anti-Tarnish	1.15 to 1.20
Colored	—
Anti-Tarnish Kraft	.70–
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60–
Napkins, full crepe and emb'sed (12½ lb to M shts.) per cs.	.60–
Toilet, Bleached (M shts.) per cs.	6.05—
Toilet, Unbleached (M shts.) per cs.	4.47—

Towels—	per case
Bleached	3.39 to 3.99
Unbleached	2.76 to 3.42

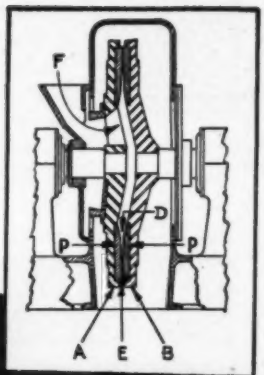
Wrappings (Kraft)—	per cwt.
Super-Standard	5.25 to 7.65
No. 1 Wrapping	5.00 to 7.40
Standard Wrapping	4.75 to 7.15
Standard Bag	4.37½
Variety Bag	4.62½—

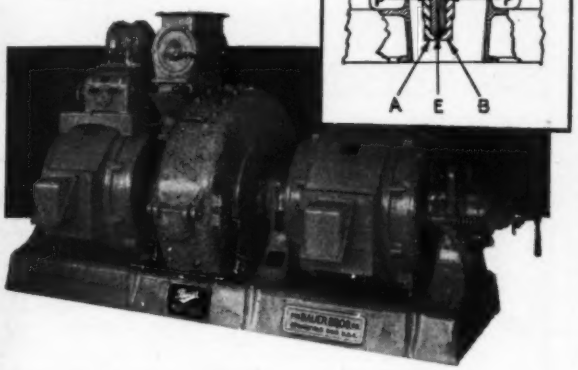
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)

Bleached Papers—	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only)	7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 50 lb.	5.50 to 5.75
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	6.00 to 6.50
Envy. Mla., Sub. 16-28 (No. 2)	5.75 to 6.00
Envy. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M.G. Sulphite and Kraft (other than Waxing)	
Grade B-20 lb.	6.75 to 7.00
Grade A-22 lb.	7.20 to 7.40

Bauer Pulpers are in service in: The United States, Canada, Mexico, Hawaii, New Zealand, Australia, India, Sweden, Russia.

Stock enters at F; passes between Plates PP at D, positioned between Disks A and B . . . and is discharged at E.





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- For all types of Insulating Board and Wallboard and Hardboard Production and for Plastics of Various Grades.
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- For removal of shive from Soda Pulp for printing paper.
- For manufacture of Newsprint, special Wrapper Stock, Board, and Specialties.
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- For use in Paper Board Manufacture as filler and Liner; for Auto Panel Board; for Wallboard Filler; in preparation for De-inking Processes; wherever freeness, freedom from cutting, uniformity, and complete defibering is required.

THE BAUER BROS. CO.
SPRINGFIELD, OHIO

Bauer
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MAKING PAPER AT A PROFIT REQUIRES SOUND PUMPS

The PREFERENCE FOR *Goulds* IS SIGNIFICANT!

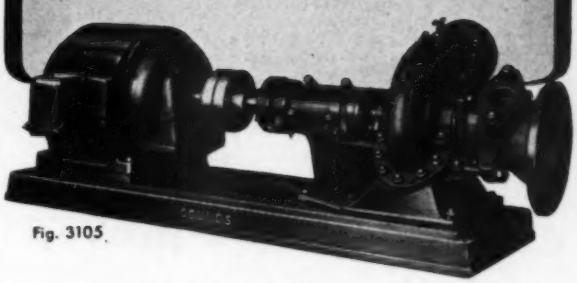

Fig. 3105

TREMENDOUS quantities of water are used in making paper. To make it profitably you can't beat Goulds pumps. And it's no secret that a high percentage of paper mills are equipped with Goulds. They handle paper stock efficiently, are easily maintained.

If you are not using Goulds Fig. 3105 stock pumps, consider their many advantages:

1. Top horizontal discharge prevents air binding.
2. Diagonally split casing permits removal of impeller, including bearing assembly, without disturbing either suction or discharge connections.
3. Special warped vane heavy-duty, positive flow, non-clogging impeller handles stock of light to heavy consistency.
4. Ejector vane creates secondary pumping action back of impeller to prevent accumulation of stock.
5. Wash out connections in both sides of impeller make pump easy to keep clean.
6. Casing and bearing support are integral casting, bored in one operation to assure perfect maintained alignment.

THESE PUMPS ARE OFFERED IN FOLLOWING AVERAGE RATINGS:

Discharge Size	G.P.M.	Head	Motor R.P.M.
4"	500-1200	200-160	1750
6"	800-2400	220-160	1750
8"	1200-4000	160-100	1150

For literature describing Goulds Stock Pumps, write Pump Headquarters or your nearest Goulds Office.

Goulds PUMPS, INC.
the PUMP FOR the JOB SENECA FALLS, N. Y.

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★ Often, the simple installation of a Lewellen Variable-Speed Transmission or Motor Pulley performs production miracles. Many times, however, even a Lewellen "packaged installation" cannot deliver the results required for highest efficiency. It is our business to know when your problem is simple or complicated. The experience of this organization — pioneers in speed-control — is available to you.

Lewellen Variable-Speed Transmissions, Variable-Speed Motor Pulleys and Automatic Controls serve industry everywhere. Lewellen engineers are constantly finding new ways to adapt modern speed-control to fixed-speed machines and to improve inefficient speed-control methods. Tell us your problem! Look to Lewellen! Lewellen Manufacturing Company, Columbus, Indiana.

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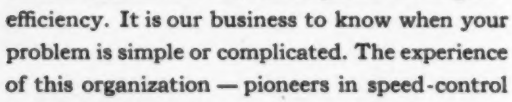

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Armstrong Machine Works .....
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Atkins and Company, E. C. 901
Atlantic Steel Corp. 909
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Bailey Meter Company 793
Baldwin - Duckworth Div. of Chain Belt Company 875
Bauer Bros. Co., The 911
Becco Sales Corporation.....
Beloit Iron Works 739
Binney & Smith Co. 907
Bird Machine Company 763
Birk & Choporis 909
Black-Clawson Co., The 827
Bowser, Incorporated 903
Bowsher Co., The N. P. 876
Brown Instrument Co., The .....
Buffalo Forge Company.....
Buffalo Pumps, Inc. .....

Calco Chemical Division, American Cyanamid Company .....
Cambridge Instrument Co., Inc.....
Cameron Machine Co. 874
Carbonite Metal Co., Ltd. .....
Carthage Machine Co. .....
Cash Company, A. W. 899
Chain Belt Company 875
Chamberlain Engineering Corp. .....
Chemipulp Process, Inc. 890
Chicago Bridge & Iron Co. 750
Chicago Electric Company 880
Chromium Corp. of America .....
Clark Tructractor Division of Clark Equipment Company 768
Classified Advertising 912
Clayton Manufacturing Co. 778
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. ....
Columbia Chemical Division 748
Columbian Carbon Company 907
Columbian Carbon Company, Magnetic Pigment Division .....
Cooper Alloy Foundry Co., The 749
Crane Co. 845

Darnell Corporation, Ltd. 902
Davis and Thompson Co. 888
De Laval Steam Turbine Co. 781
DeZurik Shower Company 896
Diamond Alkali Company 751
Dilts Machine Works 827
Dodge Manufacturing Corporation ... 885
Dow Chemical Co., The .....
Downingtown Mfg. Co. ..... 1st Cover
Draper Brothers Company 883
Dresser Industries, Inc. .....
du Pont de Nemours & Co., E. I. ....
Duriron Co., Inc., The .....

Eastern Stainless Steel Corp. .....
Eastwood-Nealy Corporation 862
Economy Co., Inc. .....
Electric Machinery Mfg. Co. .....
Electric Steel Foundry 753
Elwell-Parker Electric Co., The .....
English China Clays Sales Corp. ... 884

Fairbanks, Morse & Co. .....
Falk Corporation, The .....
Ferguson & Co., Hardy S. 876
Fitchburg Screen Plate Co., Inc. ....
Fleishel Lumber Company .....
Flexible Steel Lacing Co. .....
Fiori Pipe Company .....
Foxboro Company, The 805
Fritz Publications, Inc. 909, 914

Garlock Packing Co., The 907
Gates Rubber Company 873
General American Transportation Corporation 752
General Chemical Company 785
General Electric Company 786-787
Glidden Company, The .....
Goslin-Birmingham Mfg. Co., Inc. ..... 2nd Cover
Goulds Pumps, Inc. 911
Grinnell Company, Inc. .....
Groch Engineering Co. .....
Gruendler Crusher & Pulverizer Co. .

Hanchett Manufacturing Co. 870
Hardy, George F. 890
Harper Company, The H. M. .....
Harrington & King Perforating Co. .. 912
Harris-Seybold Company 759
Hermann Mfg. Co., The .....
Hooker Electrochemical Co. .....
Hooper & Sons Co., Wm. E. 825
Hudson-Sharp Machine Company 899
Hunt Machine Co., Rodney .....
Huyck & Sons, F. C. .....
Hyster Company 831

Improved Paper Machinery Corp. 789
Ingersoll-Rand Company 871
Ingersoll Steel & Disc. Div., Borg-Warner Corporation 796
International Nickel Co., Inc. 889

Jeffrey Mfg. Co., The .....
Jenkins Bros. .....
Johnson Corporation, The 912
Jones & Sons Company, E. D. 773
Jones Foundry & Machine Co., W. A. 894

Kalamazoo Tank & Silo Co. 878
Kalamazoo Vegetable Parchment Co.
Kelco Company 788
Kohler System Co., The 858
Koppers Company, Inc., Bartlett-Hayward Division 769

Langston Co., Samuel M.....3rd Cover
Layne & Bowler, Inc. 850
Lewellen Manufacturing Co. 912
Lindsay Wire Weaving Co., The 901
Link-Belt Company 741
Lockport Felt Company 868
Lodding Engineering Corp. .....
Lunkenheimer Co., The 852

Magnetic Pigment Division, Columbian Carbon Company .....
Magnus Chemical Co., Inc. 886
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Mathieson Alkali Works, Inc. 742
Michigan Steel Casting Co. 882
Midwest Piping & Supply Co., Inc. ..
Monsanto Chemical Company..... 746
Morey Paper Mill Supply Co. .....
Mt. Vernon-Woodberry Mills, Inc. ... 779
Murray Mfg. Co., D. J. 897

Nash Engineering Co., The 899
National Bearing Division, American Brake Shoe Company E01
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National Publishers Assn., Inc. .....
National Research Bureau, Inc. .....
National Safety Council, Inc. 898
Naylor Pipe Company 848
Nichols Engr. & Research Corp. 866
Norma-Hoffmann Bearings Corp.....
Northern Engineering Works 747
Northwest Engineering Co. 767
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Oakite Products, Inc. 897
Ohio Injector Co., The 869
Oliver United Filters, Inc. 834-835
Orr Felt & Blanket Co., The 895
Orton Crane & Shovel Co. .....
Owen Bucket Company, The 856

Paper & Industrial Appliances, Inc. .. 851
Paper Makers Chemical Dept. of Hercules Powder Company .....
Patterson Foundry & Mach. Co. ....
Peerless Pump Div., Food Machinery Corporation 903
Perkins & Son, Inc., B. F. 799
Permutit Company, The 796
Philco Corporation 909
Pittsburgh Piping & Equipment Co. .. 847
Pittsburgh Plate Glass Co., Columbia Chemical Division 748
Poole Foundry & Machine Co. 905
Powell Company, The Wm. 857
Pusey & Jones Corp., The 757

Raymond Service, Inc., Charles P. ... 912
Reed-Prentice Corp. 887
Reichhold Chemicals, Inc. .....
Reliance Electric & Engr. Co. 777
Research Corporation 879
Rogers & Co., Samuel C. 892
Roofing Machinery Mfg. Co. 776
Roots-Connersville Blower Corp. ....
Ross Engineering Corp., J. O. 784
R-S Products Corporation 744
Ryerson & Son, Inc., Joseph T. 802

Sandusky Foundry & Machine Co. ...
Sandy Hill Iron & Brass Works, The 780
Shartle Bros. Machine Co. 827
Shuler & Benninghofen..... 863
Smith & Winchester Mfg. Co. 905
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Standard Oil Co. (Indiana) 829
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Timken Roller Bearing Co., The 740
Titanium Pigment Corporation .....
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Towmotor Corporation 761
Trent Tube Manufacturing Co. 905
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Tube Turns, Inc. 775
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U. S. A. Treasury Dept. 893
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Valley Iron Works Company..... 798
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Waldron Corporation, John 797
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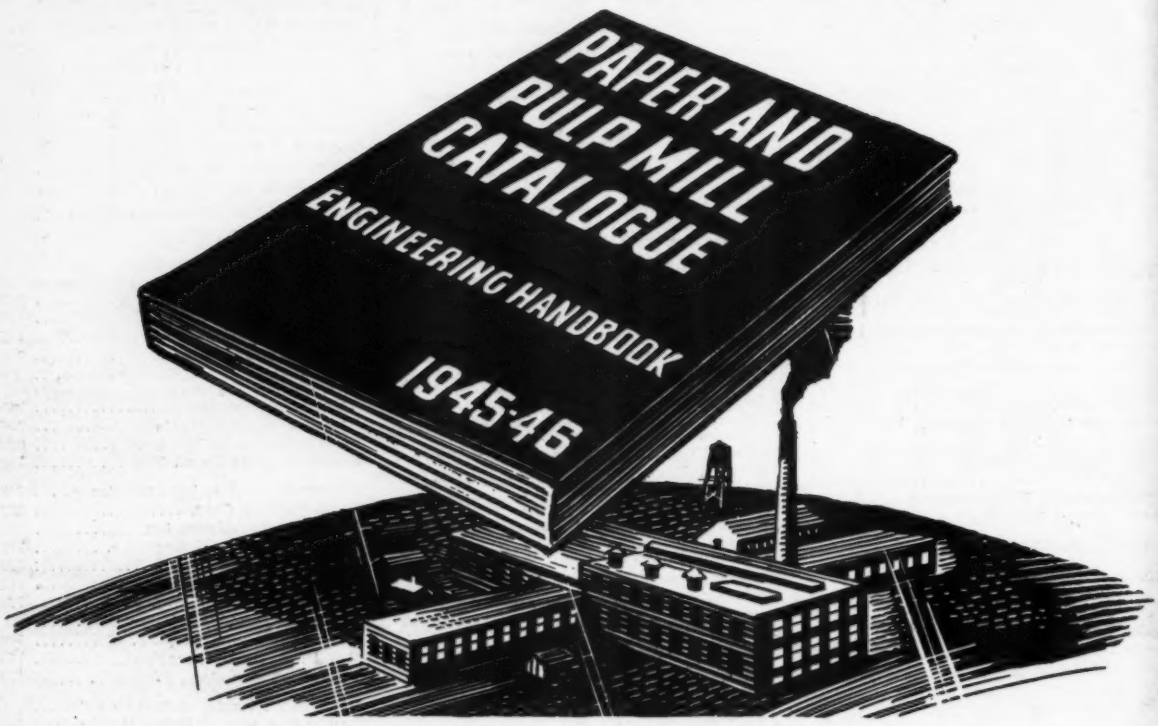

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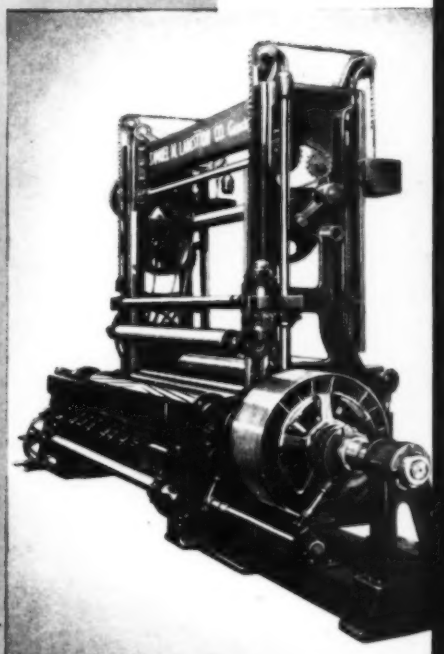

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